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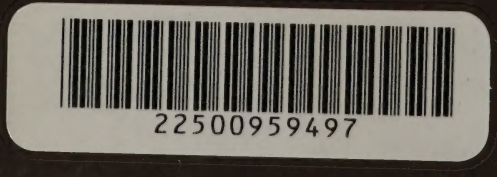

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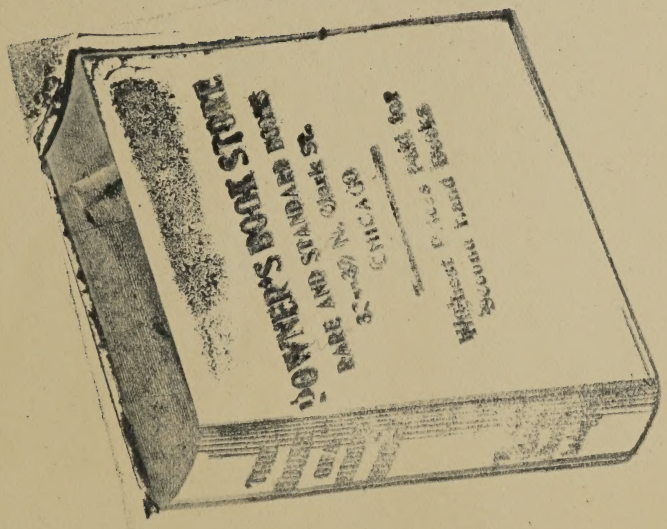

PUBLIC HEALTH

PAPERS AND REPORTS

VOLUME VI

PRESENTED AT THE EIGHTH ANNUAL MEETING OF THE

American Public Health Association

(New Orleans, La., Dec. 7–10)

1880

WITH AN ABSTRACT OF THE RECORD OF PROCEEDINGS

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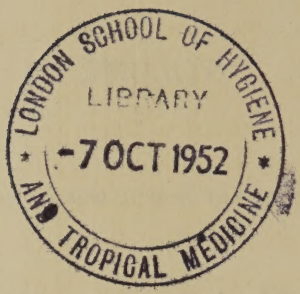

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INTRODUCTORY NOTE.

BY THE SECRETARY.

THE sixth volume of the papers and transactions of the American Public Health Association comprises the essays presented and the record of the work done at the Eighth Annual Meeting of the Association, held in the city of New Orleans, La., Dec. 7–10, 1881.

The assemblage of a hitherto unequalled number of sanitarians of prominence, the remarkable list of accessions to the membership of the Association, and the high character of the papers presented with the discussions thereon, mark this as the most significant and successful of the meetings held by this body.

Perhaps not less remarkable and satisfactory than the features just named was the circumstance that, although convened in the principal habitat in this country of yellow fever, the city of New Orleans, so effectual have been of late the influences of sanitary knowledge and authority, — and in its exclusion largely it is believed as the result of the work of this Association, and its child, the National Board of Health, — that for the first time in four years yellow fever ceased to absorb the session, and the consideration of other topics became mainly the event.

Of the papers presented, it is not improper to remark that they are among the most valuable ever offered the Association. Three of them at least will be universally recognized as contributions to the subjects of which they treat, of such value, as to originality, research, and exhaustive detail as to confer great honor upon their authors and this Association, and to make it certain that they will exist as monuments to mark our progress and work.

The very full and comprehensive paper which opens the volume, "The Hygiene of Emigrant Ships," by Dr. Turner, stands pre-eminent among the fragmentary literature of that subject, and will do duty for the time as the authority upon it. The monograph of

Dr. Thomas of Savannah, upon the history of the hitherto little-recorded "Dengue," is unique in its character, and at least fixes for the first time the early traits in its family and their succession. The vigorous paper of Dr. Baker on "The Relation of Schools to Diphtheria," etc., is so suggestive in its evidence, and, withal, so opens a new and wide range of thought on a basis so well outlined, that it has already in its partial publication evoked much interest and comment. Several other of the papers hardly rank second to these in originality of inquiry and in importance; while the report of the Committee on Prevention of Venereal Diseases puts this broad subject upon its feet before the Association in a way likely to evoke careful consideration.

The special addresses command attention; and the stenographic reports of discussions, never before given in full, contribute a new value and interest to the volume, from which the previous partial publications of daily and medical journals in no wise detract.

The great gain made in the compact and effective organization of the Association, the steady addition of large numbers of strong men to its ranks, the dignity and worth of its work, and its past successes, all point to a future of promise which it is the privilege of every member to illumine and enjoy.

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I.

THE PRESIDENT'S ADDRESS.

By Dr. J. S. BILLINGS,
Surgeon U.S.A.

Gentlemen of the American Public Health Association, — Our eighth annual meeting finds us in the Crescent City, — the city in whose health-problems we have all taken so much interest, the city whose future depends so much upon sanitary science.

I take great pleasure in being able to congratulate you upon the flourishing condition of the Association, and on the growing interest shown in its meetings and its work. Its financial condition is now very satisfactory, as is shown by the report of the Treasurer, to whose energy and tact this is largely due. It numbers among its members nearly every practical sanitarian or person specially interested in public-health matters in this country; and it is especially gratifying to see so many of them present at this meeting, and thus showing, in many cases at some personal cost and sacrifice, their interest in its operations.

But, though so many are here, they are not all here. Death has been amongst us during the year; and we have to mourn the loss of our first Vice-President, Dr. Samuel Choppin of this city, and of Dr. Samuel Lilly, the member of our Advisory Committee for the State of New Jersey. Dr. Choppin had become well known to us at the last two meetings of the Association as a man of great energy, who had opinions of his own, and the courage to act on them in spite of strong opposition; and his untimely death is especially deplorable at the present time. Dr. Lilly was perhaps less known to the Association; but he was a prominent man in his State, and took much interest in the progress of public hygiene. At the time of his death he was one of the judges of the Court of Appeals, and specially interested in the question of how best to deal with the criminal insane.

Our constitution declares that "the objects of this Association shall be the advancement of sanitary science, and the promotion of organizations and measures for the practical application of public hygiene."

Science, sanitary or other, is advanced by the increase or by the diffusion of knowledge. The work of such associations as this is mainly the diffusion of the knowledge of the discoveries made by individual investigators, by providing an audience for those who have something to tell us about the causes of diseases or the best means of avoiding or destroying them, and, by this educational process, on the one hand stimulating research, and, on the other, securing practical results.

Until quite recently very little has been done in this country towards in-

creasing our knowledge of the causes of disease by observation and experiment directed to that end. The discovery by Dr. Bowditch of the relation between soil-moisture and consumption is the principal thing of this kind which we have to note. We have not had the statistical data, such as the registration system of Great Britain provides, nor the laboratories for experimentation in comparative physiology and pathology, such as are to be found in Germany, nor the trained statisticians and scientific observers who could make proper use of these things if we had had them. All these, however, will come: some of them are now here. For the most part they can only be provided by governments, their cost and the length of time required to produce really valuable results placing them beyond the reach of individual effort.

It is therefore one of the duties of this Association to use its influence to induce our legislative authorities to provide for scientific sanitary investigations, and to see that these are committed to proper persons, and the results duly published. We have already done something in this respect as regards the work of the Yellow-Fever Commission, and of the National Board of Health; but we ought to do more. The report of the Yellow-Fever Commission, although completed, has not been published; and the same is true as regards the report of the Havana Yellow-Fever Commission of the National Board. These reports have been prepared by competent men with much labor and at considerable expense, forming a substantial addition to our knowledge of this sphinx of diseases; and it would be well if this Association would formally urge their speedy publication.

At the recent meeting in Boston of the Association for the Advancement of Science, Professor Barker gave an eloquent oration on the problem of life, in which he declares, that though the answer is not yet, "and though the *ignis fatuus* of life still dances over the bogs of our misty knowledge, yet its true character cannot finally elude our investigation."

The prediction may be over-sanguine; but the best and most highly cultured brains in the world are attacking the problem on all sides with the balance and the microscope, with the culture-cell wherein we may almost see the evolution of the simplest organisms, or with the plethysmograph upon whose dial we may read off the intensity of the thought of the person to whom it is applied: and we may hope for great advances within a few years in our knowledge of vital processes, and of the circumstances which favor or hinder those processes. Now, all such advances are advances in sanitary science also. It is probable — that is to say, it is more than an even chance — that, if we knew the whole life-history of half a dozen minute organisms with the re-actions which occur between these and surrounding media, — such as air, water, and organic matter of various kinds, dead or living, — we should know the causes of some of our most destructive diseases, and could proceed with their prevention upon truly scientific principles.

The work of educating the public as to the importance of sanitary measures has progressed well during the past year, and has been carried on, not only by physicians, but by the pulpit and the press.

The growing interest of the clergy in public-health matters is very satisfactory, since it is desirable, for the sake of both religion and hygiene, that clergymen of all denominations should be practical sanitarians.

Foul air, food badly cooked, impure water-supply, and dirty skins are responsible for a vast amount of sin and crime; and ignorance and filth are Siamese twins.

All clergymen recognize these facts in a theoretical sort of way; but many of them do not see that it is their duty to qualify themselves to give to their parishioners practical advice to secure cleanliness as well as godliness. Nor is the necessity for such advice confined by any means to the occupants of shanties and tenement-houses. The health and cheerfulness, and consequently the morality, of the families of many of those who pay for the best pews in our most fashionable churches, would be greatly improved if they had purer air to breathe in their houses. A faulty system of house-drainage will produce, not only actual sickness and death, but lassitude, want of appetite, weariness and fretfulness, dissatisfaction among and with the servants, and a pessimistic state of mind with regard to things in general, upon which the weekly sermon will have very little influence. Let the clergyman learn to recognize the real, palpable, material bogies which lie in his path, and how these are to be destroyed or driven away; let him obtain sufficient knowledge of the laws of physics, physiology, and existence, to keep him from certifying blindly to the efficiency of patent nostrums of various kinds; let him understand the difference between skin-plumbing and good work, between a properly ventilated church and one in which the occupants run great risks of either a headache or a cold; and it is safe to say that he will have doubled his usefulness.

The daily or weekly newspaper is also doing effective work in diffusing sanitary information in this country. A collection of the various articles on drainage, sewerage, water-supply, and other matters relating to public health, published in the news or editorial columns of such journals during the year, fills several large volumes.

At first sight an examination of this mass of matter might lead one to think, that, as an indication of progress, it is a little like the register which the ingenious Irishman obtained from his gas-meter after he had put it on upside down, and so managed to bring the company in debt to him at the end of the month.

From nearly all the great cities come complaints of impure water, of insufficient and defective sewerage, of trouble with the system of garbage removal, of dirty streets, overcrowded and ill-ventilated schools, and of local outbreaks of preventable diseases; but it is probable that this is due rather to an increase of knowledge of the evils complained of than to an increase in the evils themselves.

While much of the cheap and easy declamation about sanitary matters, which is so prevalent, is of the nature of an advertisement, yet the froth and scum show that there is a current beneath, and to a great extent show its

direction. Slowly but steadily there has arisen, and is growing, a belief that much of our sickness and death is preventable; that we ought to be able to make our cities as healthy as the country; to lengthen the average duration, and increase the comfort of human life; and from people of all conditions, capitalists and laborers, from the mills and workshops of the North, the crowded streets of our great cities, and the low-lying, malarious prairies and swamps of the West and South, comes to the educated and thinking men of the country — to the engineers and lawyers and legislators, as well as to the physicians — a demand to put away these plagues which consume our children.

To meet this demand requires knowledge and labor: and here, surely, knowledge is power; and, without it, much of the labor must be misdirected and in vain.

Our knowledge of the causes of disease is confessedly fragmentary and imperfect. It is easy to speak of foul air and foul water in this connection; but our ideas as to what constitutes foulness are, as yet, far from clear. Drinking-water contaminated with organic matter, or even with sewage, does not always produce disease that is immediately perceptible: if it did, the majority of our villages, both North and South, would be hospital-camps. Breathing foul air, sewer-gases, etc., is not surely morbific: if it were, the inhabitants of our great cities would be a race of invalids.

We do not know why the fever spreads one year like fire in the dry grass while in another year it is confined to one or two limited localities. We do not know why, of late years, malaria has been steadily increasing along the New England coast, nor why it alternates with typhoid on the mountain-sides of North Carolina and Virginia.

When I say we do not know these things, I use the word "know" in the scientific sense, as conferring the power of prediction.

Every one who has made personal investigations in such matters can readily recall instances where apparently vigorous health flourishes in spite of the most insanitary surroundings; where he has seen strong and ruddy children playing in the filthiest alleys and houses; where he has found children packed in close schoolrooms, almost like sardines in a box, and has been unable to prove that any marked effect on health has been produced; and where men have lived to a ripe old age in spite of the habitual use of alcohol and the most indigestible foods, and of reckless exposure and dissipation of all kinds.

It is little wonder that men who are not well trained in scientific methods of thought should, on meeting with these exceptional cases (for although numerous, they are exceptional), be disposed to deny that there is such a thing as sanitary science.

So far as personal hygiene is concerned, each man must, to a great extent, be a law unto himself, and learn by personal experience what to do and what to avoid, though the experience often kills him about the time the lesson has been acquired.

The young man in good health and spirits, who hardly knows that he has a stomach, has a sort of good-humored contempt for those who advise prudence

as regards tobacco or liquor, late suppers, etc., and is inclined to think that his mentors "would, if they could;" in which he is not always wholly wrong, for it is one thing to preach, and another to practise. From another point of view, it may seem that we have little or no power over the causes of disease, and that, as Parkes suggested, it may not be intended that man should be healthy. This is going back to the old Greek fate *Αναγκη Δαίμονων*.

The foundation upon which all science rests, is the belief that like causes, under like circumstances, produce like effects.

"The curse causeless shall not come." We do not believe that disease comes by chance, or by the intervention of special providences, but in accordance with fixed laws; and we are by no means disposed to fold our hands in a despairing Nihilism. "Do not let us devote ourselves to the Fates, while we yet may have hope in the Gods."

We do not know much; but we know something, — enough certainly to make it clear that we can know more, and that sickness and death are due to the same things and forces, which, rightly used and guided, will produce fertile fields and length of days.

And we know enough already to be able to improve greatly the sanitary condition of many places, if we could only get this knowledge applied. The majority of our cities are blundering along in a purblind and perfunctory sort of way, doing much bad and wasteful work, spending large sums to bring water into each citizen's house, but making no provision to remove this same water after it has been made foul by use, thus compelling dangerous air and soil-pollution; building sewers on improper plans, and with no sufficient consideration as to the future extension of the city, often making them little more than long subterranean cesspools, generating offensive and dangerous gases, and so locating their outlets as to contaminate the water-supply of their neighbors. They will spend millions on marble city-halls and civic displays, and yet withhold the few thousands necessary to provide properly lighted and ventilated schoolhouses for their children.

And so I might go on with a catalogue which is sufficiently familiar to most of you, and whose iteration would be as wearisome to me as it would be to yourselves and to the public.

Cassandra, the unfortunate daughter of Priam, doomed to foresee the coming evils, but powerless to obtain belief in her predictions, or to induce effort to avert the impending storm, is a type in more ways than one of the educated sanitarian of to-day. Yet the cry of "wolf" may be raised so often without sufficient grounds, that the public will become indifferent. It does not easily distinguish between the voice of the really skilled scientific man and the echoes of the pseudo-sanitarian and alarmist; and in this branch of knowledge, as in those spoken of by Goethe, "the voices are few, though the echoes are many."

"In natural studies, as in art, an exaggerated demand brings forth a supply of an inferior article, which swamps the superior, creating a risk of drowning science in its own popularity."[1]

[1] Br. & For. M. Chi. Res., 1873 to 11, p. 293.

So far as care for the public health is concerned, — that is, the endeavor by united effort to secure pure water, air, and food, to prevent accumulation of filth on or in the soil around our houses, and to stop the spread of the self-propagating diseases, — the larger part of this country is in only the first stage of civilization.

As a rule, it is only in large cities and their suburbs that any practical effort is made in this direction, — that taxes are levied, and the sacrifice of certain individual interests demanded, to preserve the health of the mass. But silently there is growing among the people an opinion that these things are important; an interest in the discussions as to what is best to be done, based on the conviction that certain diseases which cause much sickness and death amongst us can be prevented, not by individual but by conjoined effort.

We have not yet got so far as to take it for granted, in case of an epidemic of typhoid fever, or diphtheria, of small-pox, or yellow fever, that some one must be to blame; that there has been either negligence or positive misconduct on the part of some person or persons, who must pay the penalty. No doubt this may come in time; and such penalties may be enforced, not only by municipal authorities against individual citizens or corporations, but by the State against cities. It is not only useless, however, but positively injurious to the cause of public hygiene to urge legislation in this direction faster than is demanded by the mass of the people and the business interest of the country.

The whole matter of public hygiene involves a conflict of interests (a conflict which is often apparent rather than real, it is true); and, when a city or State takes really effective measures to prevent disease, dissatisfaction and opposition on the part of some person or persons who are interfered with will very soon be manifest. The public interests are usually vague, far-away things to a man, until they become private interests also; until his personal comfort or income begins to suffer.

It is proverbially difficult to appreciate the direction and strength of the currents of popular opinion, or how far it may be relied on to support a given course of legislation, as most politicians know to their cost; and hence it is always a little uncertain as to how far the people are desirous of having really skilled supervision of the public health.

In the atmosphere of this Association it may seem as if the matter is very clear; and, in listening to the papers and discussions, one might suppose that there was no doubt whatever as to the desirability and economy of health officers or boards of health, municipal, State, and national, and that public hygiene would be a better issue to make than public finance.

When, however, the sanitarians come before legislatures with their propositions, they find that the matter is not so simple and self-evident as it appears upon this floor. Not that they will find any one denying the importance of the public health or the desirability of scientific investigations into the causes and means of prevention of disease, — certainly not; but they will hear a good deal about liberty and monopolies and economy, and they will find a good deal of opposition to the particular method that is proposed.

There is a good deal of truth in Dr. Le Conte's remark, "that upon no class of minds has the progress of contemporaneous science had so little influence as upon the legal, and no kind of business has been so slightly modified by its influence as legal procedures." Also, we know by experience, that, when the sanitary fat does get into the political fire, there is a terrible sizzling, and the result is often disastrous.

In conversations with prominent health officials, I find that their difficulties and troubles may be placed in two classes.

The first are those connected with the fact that they cannot make a living by devoting themselves entirely to sanitary work, as they would like to do; that there is not sufficient demand for thoroughly educated scientific men as health officers to give such pay for their services as they require; and that, therefore, they have to do other things, to practise medicine, etc. Another feature of this discouraging prospect is the uncertainty of tenure of office, owing to political changes; and it is this, mainly, which prevents young men of brains and education from taking up sanitary work as a permanent profession. This, however, is merely one branch of the vexed question of civil-service reform, and I do not propose to discuss it. I will only say, that no health officer in this country who is required, or ought to be required, to devote his whole time to sanitary study and work, and who is qualified for his post, receives one-half the compensation which he could earn in other professional work.

Those who have done the best work in public hygiene have not reaped corresponding pecuniary rewards; nor is it to be expected, that, in this sense, the study of sanitary science, or the fitting one's self to act as a public health official, will pay the individual. You must work for other people's benefit, — for people who will object to and grumble at your work, and resist, as far as may be, your efforts to add to their health and comfort, while preventing them from interfering with the health and comfort of others. "*Sic vos non vobis;*" and unless you like the study for the sake of the study, and the work for the sake of the work, you will not continue long to make sanitary science and art your principal occupation.

The second class of discouragements which beset our sanitarians relates to the doubts and uncertainties connected with the subjects of their study. To some of these I have already referred; but I wish to allude more especially to the difficulty in learning whether a community is healthy or not, — in other words, to the uncertainties of vital statistics. The more experience one has in collecting and tabulating such statistics, the more doubt one is apt to feel, not only as to their accuracy, but as to the possibility of making them accurate.

This applies especially to the causes of death; for, in about half of the cases, probably no three physicians would, without consultation, certify precisely the same cause of death. A leading physician and sanitarian told me the other day that he thought, that, in three-fifths of all cases of death certificates, the certifying physician hesitates between at least two, and often between three, names for the cause of death, and is as likely to insert the one as the other.

But if this is true as to the causes of death, what shall we think of the pros-

pect of being able to obtain a complete and reliable system of notification and of registration of disease? Yet it is to such a registration that every sanitarian looks forward hopefully as a means of giving scientific precision to his work; and, without it, it is difficult to see how we can measure the effects or decide as to the relative merits of different sources of water-supply, or different systems of drainage, sewerage, etc.

In this connection I would specially invite the attention of the Association to the attempt which is now being made, under the auspices of the National Board of Health, to secure a uniform nomenclature of disease, and a uniform system of tabulating mortality statistics. The matter is one of great interest and importance to sanitary science; and the Association should use its influence to secure in every State a reliable registration of births, marriages, and deaths, and the publication of the results of this registration in such a form that they can be readily compared with those of other States.

Within the last year or two there has been a great increase in the number of local health authorities, usually in the form of boards of health, each composed of several very estimable gentlemen, often having very vague ideas as to what they ought to try to do, and with very little power or means to do any thing, except, perhaps, to establish a local non-intercourse quarantine. I wish to make one or two suggestions to such organizations as to methods of commencing work.

The first thing to be done is to provide for a registration of deaths, which can best be secured by a law or ordinance to the effect, that, in every case, the head of the family, or the householder, shall make a return of the death, and obtain a permit for burial or removal of the body; and that failure to do this shall be taken as evidence of suspicious circumstances connected with it sufficient to warrant the action of the coroner.

The second thing to be done is, to take an account of stock by making a sanitary survey of the place, and putting on record the condition of each set of premises. The health officer of a place should have in his possession a brief description, from a sanitary point of view, of every premises in a city; and a person proposing to buy or rent a dwelling-house ought to be able, on the payment of a proper fee, to obtain a certified copy of the sanitary history of the house he proposes to occupy, its connection with sewers, the number and causes of the deaths that have occurred in it, or in the square in which it is situated, etc., just as much as he is able to obtain a record of title. With a careful sanitary survey as a basis, it would not be difficult to keep up this record.

It should be distinctly understood that I am not proposing that the sanitary department shall give certificates of "health worthiness," or opinions as to the healthfulness of the premises. The possibility of such certificates has been recently discussed before the London Society of Arts, the great objection being, that in old houses it is so difficult as to be almost impossible to make such inspection as would be necessary for this purpose. What I propose is, a record of facts, and not a certificate of opinions.

If a newly formed health authority will do the two things I have mentioned, I have no doubt of its success, nor will it need any further directions as to subjects for work.

For several years I have been comparing the results of the work of municipal health officers, as contrasted with that of municipal boards of health, both in this country and Europe; and I think, that, in the great majority of cases, the single officer succeeds better than the board. Where the health-officer system fails, it is often because the officer attempts to continue to practise his profession and perform his sanitary duties.

It is not desirable that a health officer should be a practitioner of medicine; for, if he is, he can hardly avoid the distrust and dislike of his fellow-physicians if he does his duty; nor can he be expected to be as severe on the nuisances due to his wealthy and influential patients as on those of others.

The great administrative problem, says Mr. Chadwick, is to unite interest with duty, corroborating Jeremy Bentham, who says, that "in the ordinary tenor of human life there is a general habit of self-preference, which is not a reasonable cause of regret, but is an indispensable condition to the well-being of man. Here and there may be found a man who will sacrifice self-interest to social interest; but such men are not more frequent than insane: and it is in what has place in the conduct of the thousands, and not in the exceptional one in a thousand, that all rational and useful political arrangements will be grounded." All this we may grant, and must remember when we come to permanent organization for sanitary work; but it does not hold true for those who inaugurate the movement, — the pioneers in sanitary reform.

As I have already said, their personal interests will almost surely suffer; yet none the less do they lecture and write and labor to correct the evils which they see around them. "Like Saul, the son of Kish, they go forth to find their father's asses, and they don't have to hunt long."

It may be proper here to refer briefly to sanitary associations auxiliary to local boards of health. It is unnecessary to point out the utility of such organizations. They often, in fact, do much more than the health authorities which they aid, not only because they have more money, but because they have more influence with the press and the people than the officials, and can do things which the health officer would hesitate about undertaking, lest he should get into a quarrel with some other branch of the city government, or be accused of wishing to act the despot by some of the unsuccessful candidates for his office.

Health officers and health boards often look at these self-constituted auxiliaries and critics with a great deal of distrust at first, and think, that, if they could only control the expenditure of the funds of the association, they could do a great deal more good than the association does. All this is natural enough, but it is not wise. The auxiliary association must go its own way; and it must preserve its independence, or it will soon lose its power.

If the health officer is a man of good sense, he will find such an association of powerful help, and will promote its formation and work by every means in his power.

Our last two meetings, at Richmond and at Nashville, were generally recognized as being held in important emergencies, and their deliberations commanded wide-spread attention.

The present meeting is also an emergency, which is the more important since it is not recognized by the public.

The emergency of the sanitarian comes, in fact, just at the time when the public sees no danger and no necessity for doing any thing.

During the past year the country has been prosperous; the crops large, and finding ready markets; the furnaces and looms and shops of all kinds active. We have been free from war and from great epidemics; and although a hundred thousand deaths have occurred among us which might have been prevented, and two hundred thousand of our people have been constantly sick and suffering from causes which we have every reason to believe might have been avoided, yet this great loss and sorrow have been so distributed among our fifty millions of people, that it has, for the most part, been lost sight of, and has not attracted attention except in a few scattered instances.

When the times are thus prosperous, the streets of our cities noisy with traffic, their depots and docks and levees crowded with freight, taxing to their utmost the capacity of their cars and ships, it is not easy to induce people to take thought of the evils to come, nor are they disposed to listen with satisfaction to those who trouble their content by urging on them drainage or sewerage, or other costly works needed to secure dry, clean soil, pure water, and air free from dangerous or offensive contamination. They say to the sanitarian who is warning them, "Hush! wait a little; don't make a fuss: you will injure the reputation of the city; you will drive away commerce. We are no worse than our neighbors, nor than we have been before. We will attend to these matters by and by; for you are probably right in your advice. But wait until after the election: we must not propose additional taxation *now*, or we shall be defeated," etc.

It was so of old time: "Yet a little sleep, a little slumber, a little folding of the hands to sleep." "So shall thy poverty come as one that travelleth, and thy want as an armed man;" and "to the great city which felt that it should sit as a lady forever, there came in one day widowhood and the loss of children."

It is very easy to be cynical over public-health organization and administration, not only in this, but in all countries. What is done is so far short of what might be done, — the practice corresponds so little with the theory, — that there come hours in the life of every sanitarian when he is inclined to think that it is a waste of time to contend with the self-satisfied ignorance or short-sighted selfishness which oppose every effort of prevention or restriction of disease. Such moments of doubt and discouragement are, however, by no means peculiar to sanitarians. They come to every man; and it is fortunate for civilization, morality, and science, that they come but seldom, and are usually of brief duration. The truth is, as Kingsley says, that the egg is by no means addled, though the chick often breaks the shell in a somewhat cross-grained fashion.

We pass to and fro, through our nights and days, like a shuttle through the web, occasionally catching a glimpse of the pattern which we are helping to weave; but these glimpses are few and short, — quite as often on the wrong side as the right. The pattern is very large, and each of our lives forms but a single thread in it: hence it is not strange that it often seems distorted or shapeless, or that we cannot see the effect of labors.

It is our business, each in his own place, to do the work that lies next at hand for us, and to do it with our might, "seeing that there is neither work nor device nor knowledge nor wisdom in the grave whither we go."

II.

ADDRESSES OF WELCOME

By Gov. LOUIS A. WILTZ of Louisiana, Mayor I. W. PATTON of New Orleans, and Dr. J. P. DAVIDSON.

Gov. Louis A. Wiltz addressed the Association as follows: —

Mr. President and Gentlemen of the American Public Health Association, — On the part of the scientists and medical faculty, as well as of all citizens who take interest in questions relating to public health, all who seek for material progress and public prosperity, and all who favor wise sanitary legislation, I am authorized to extend the hand of cordial welcome to the members of the American Health Association. Not only these and all our learned classes, but the masses of our citizens likewise join in this salutation, with just pride that their State and city are thus distinguished by your choice and honored by your presence. We all feel that the selection of New Orleans as the place of the annual meeting of a body so eminent, and for objects of such high import, is a favor and an honor to be received with thankful pleasure. We know that you might have chosen a place of meeting which you could have reached in less time and at less expense, — some city more convenient, because more central and better favored with lines of rapid travel. Had you done so, no complaint would have been raised here. Good care will be taken that you do not repent your choice; for, however intelligently your great work might have been appreciated elsewhere, however kindly you might have been entertained in some other city, I am sure you will find as much appreciation and as much hospitality in New Orleans.

You are the representatives of the medical faculty of the whole country, and the people of this city know very well how to give to that profession the exalted esteem and consideration to which it is entitled. While fortunes and imperishable records have been won by Louisianians in other pursuits, there are no names dearer to the memory and hearts of our people than those of the great doctors who have studied at our schools and spent lives of toilsome practice among our families. No names are spoken with more reverent affection among us than those of the worthy, learned, and noble men who fought here against disease and pestilence until gathered to their rest. Taught by them, and by those now living as their worthy successors, our people know what esteem and consideration are always due to good doctors. They know what it costs to become practitioners deserving of confidence, the careful probation which they must undergo, the toilsome study by which they must add

to scholastic attainments the scientific knowledge which the rules of the profession wisely exact. They know that the confidence of the people is gained slowly, even by the most deserving, and that perplexities meet the physician on every side until such confidence is gained. They know what success costs: that it is only through long and close study that the student enters the outer door of the profession; that it is only through patient waiting that practice comes; that it is only through practice made successful by skill and judgment that professional honors are won. In your profession success presupposes desert more uniformly than in any other pursuit: and such success is the substantial diploma awarded for profound study, and for long and patient attendance upon the suffering; for midnight rides through rain and snow; for countless acts of self-denial; for manly forbearance towards the unreasonable, the petulant, and the envious; for calm toleration of complaints, caprices, and whims; for wise reticence and counsel-keeping; and for impartial devotion to poor and rich alike. Our doctors are our best friends, because they help us when we most need help: wherefore doctors, from whatever city, State, or country they may hail, come to us indorsed with the love, the confidence, and the approbation of those families who have, like ours, found in their doctors an ever-present help in their days of trouble.

You now come from your separate fields of honorable toil to renew your cooperative exertions for the public good. You meet here to devise ways and means by which all parts of the country may be protected, to give sound advice to States and cities as to the best means of promoting health, to find out methods of preventing the importation and diffusion of contagious and infectious diseases, to contrive better safeguards against sordid empiricism and brazen-faced quackery, to promote the elevation and influence of the medical faculty, to stimulate the growth of true knowledge, to encourage scientific investigation, to purify the code of medical ethics, to raise the standard of professional character and conduct, to consolidate and strengthen the medical fraternity, and, in general, to do what may be done during the brief term of your session towards the improvement of the sanitary condition of the whole country.

I am not expected to suggest specific subjects for your consideration; but I will venture here to present one request in behalf of the reputation of my native city, which is, that you take some friendly care to examine and consider its mortuary records, its hygienic history, its present condition, its preventive ordinances, its well-ordered markets, its model hospital, its broad and open wharves, the wide diffusion of its inhabitants, and especially the cleanliness, sobriety, and orderly behavior of its laboring classes. By observing these things while here, you will be able to correct some of the very unjust and seriously damaging prejudices commonly entertained against New Orleans, spread throughout the country, and exaggerated beyond all reason or excuse. It is known, that, except in years of epidemic, our city is as healthy throughout the year as any large seaport city on either continent; yet the tongue of idle detraction or interested rivalry would make it seem a hot-bed of

pestilence. Its character is so falsified, that the occurrence or report of a solitary case of dangerous disease produces panic fear throughout a dozen States. To you the damage thus wantonly inflicted upon our commerce is very evident, and by correcting these false impressions you will confer upon us a favor of incalculable value.

It is with the utmost confidence that I pledge to members of this body from other States and cities the most courteous attention of those who represent this State and this city to all suggestions and propositions which they may offer looking to the general good. I can safely assure them that the members from this State will ask for no special consideration, nor will they claim for New Orleans any action or recommendation which will in any wise discriminate in our favor, or which will not regard the general benefit of the whole valley of the Mississippi, and of the American people everywhere. As our sanitary and quarantine authorities have at all times met the public in a spirit of entire candor, as they have at all times freely communicated to us all important facts that came to their knowledge touching the health and safety of the public, equal candor and freedom may be expected from them now. They will furnish you with facts and records relating to infectious and contagious diseases reaching back to the early history of the State. They can supply the data and statistics, which have at all times been freely communicated to the press and the public. Having long battled against diseases in all their varied forms, and having especially made valiant warfare against epidemics, they are able, as well as willing, to give to this eminent and honorable body the benefit of their experience.

Hon. I. W. Patton, *Mayor of New Orleans*, briefly greeted the Association as follows: —

Mr. President and Gentlemen of the American Public Health Association, — It gives me unfeigned pleasure, as Mayor of New Orleans, and representing her people, to bid you welcome, and to extend to you the hospitalities of our city.

Amid the investigations now being pursued by scientific inquirers, none are of greater importance than those which are being made by your Association into the origin of disease, and the discovery of means for its prevention or cure; and there is no place fitter, at this time, for your deliberations than New Orleans. For it is here that arises that mysterious disease, coming from no man knows where, and pursuing its mysterious way to its mysterious end, leaving woe, desolation, and mourning in its track; whose very name causes a panic in every bosom, and sends terror-stricken fugitives throughout the length and breadth of this land, spreading tales of horror that have no existence save in their imagination, — though the reality is, God knows, bad enough.

Among the duties incumbent upon your Association, and upon those engaged in the same pursuit, is that of tracking this lurking evil to its lair, and to

devise means, by your wisdom, to destroy it, or greatly to alleviate its violence. May God grant you success in this great undertaking! I again bid you welcome to our city.

Dr. J. P. Davidson, *Vice-President of the Louisiana State Medical Society*, addressed the Association in the following words: —

Mr. President and Gentlemen, — The pleasing duty has been assigned me to greet you in behalf of the State Medical Society and the New Orleans Surgical and Medical Association, with a cordial welcome to our city; to convey to you their heartfelt desire that your sojourn in our midst may be in every respect gratifying, and that you may carry back to your homes many pleasant *souvenirs* of this visit to us.

We feel highly honored, Mr. President, by the selection of New Orleans as the place of meeting this year of the American Public Health Association, and rejoice in the opportunity offered by your presence of drawing closer, by acquaintance and friendship, the bonds uniting in one brotherhood the sanitarians of our country. We recognize with emotions of pride the self-sacrifice and devotion to public good which have brought together, on this occasion, so many distinguished laborers in the broad field of sanitary and hygienic science, who have travelled hundreds of miles from their homes and walks in life to deliberate upon measures for limiting the prevalence of diseases generally regarded as preventable, and, by consequence, extending the comforts, the health, and the happiness of mankind.

We recall with pleasure what has been already achieved by this body in sanitary work, in the successful investigation into the nature and origin of endemic and epidemic diseases; the sources of contagion and infection, their methods of communication, and the best means for their prevention; and last, but not least, the influence of this Association in awakening a general interest in the important subjects of sanitation, public health, and preventive medicine, and the diffusion of information relative thereto among the masses of our people.

The records of these past labors give encouragement for the future; and we cannot but indulge the hope that much may be accomplished at this meeting towards arresting the great calamities of disease, which, with our present knowledge, we find it difficult to combat and prevent.

In this city, so often ravaged by the pestilence "that walketh in darkness and that wasteth at noonday," whose muffled footstep gives no warning of approach, and whose mysterious pathway is only traceable by the desolation it has wrought, your advent has been hailed by all classes of its citizens with expressions of the liveliest interest and expectation, confident in the belief that you would in your wisdom devise efficient measures for retrieving it from the scourge of the past, by promoting a system of sanitation and hygiene adapted to its necessities, — conferring on it and the vast regions of the Mississippi Valley, of which it is the great depot, the blessing of an assured future of security

and health. May the labors of this meeting be crowned by these signal blessings, and earn for it the praise of all who hold in regard the highest interests of their fellow-man !

In conclusion, gentlemen, with hearts beating in unison with your own in every aspiration for the advancement of our noble science, and going out to you in every warm and generous impulse, I bid you welcome in the name of the united profession of our State and city !

III.

ON THE HYGIENE OF EMIGRANT SHIPS.

By T. J. TURNER, M.D., Etc., *U.S.N.*

The existing statutes regulating the carriage of persons by sea are interesting to the student of sanitary science from the fact that they present to observation the marks of progress in that direction more decided than those attendant upon an abrupt innovation, or departure from the rut of old custom.

The advance of civilization can be measured by the increased comfort in the means of transportation of travellers. A glance at the earlier laws enacted for the purpose of protecting those travelling by sea, ranged in the order of time, will exhibit this; and from this view, also, it may be assumed that ship sanitation can be taken as the exponent of the general sanitary advance of a country. Slowly and silently, like the erosion of a river's bank by the stream, have the much-needed improvements in nautical hygiene been made; the rush and whirl have been in mid-current; the quiet waters near the shore have done their work; the bank has been, and still will be, eaten away. The end, however, is not yet of our time. Scurvy is rapidly becoming one of the diseases that were, under improved sanitary conditions; and the knowledge of the circumstances of its causation is so positive, that it can be reproduced upon brief notice. Ship-fever is even now a curiosity to the pathologist.

The days of the "Centurion" have passed away; the "horrors of the middle passage" grow apocryphal; and the ghosts of the "Leibnitz," let us hope, are forever laid. Just so long, however, as the integrity of the tripod of life of ships — cleanliness, dryness, and ventilation — is impaired, or even unrecognized as an essential to both the health of the ship and the sailor, just so long will these floating habitations be the carriers of pestilence and death to our shores, and cripple commerce instead of aiding it. Every foul ship carries her unseen black flag of raw head and bloody bones: somewhere the mark of Cain is upon her.

It is proposed to consider cursorily the early legislation upon the subject of the transportation of persons by sea; to cite existing statutes; to quote the latest suggested legislation upon this matter; and, with these as a theme, invite attention to the general hygiene of ships, more especially those engaged in the carriage of emigrants. The earliest legislation in the United States involving any principle of sanitary science applicable to the emigrant, is to be found in the Act approved March 20, 1819. (See Appendix I.) This

Act determined the carrying capacity of a vessel, so far as it concerned the pasenger, according to the tonnage (custom-house measurement), to be two passengers to every five tons. The penalty for exceeding the limit of carrying capacity upon this basis was a forfeit of one hundred and fifty dollars for each and every passenger carried in excess. If this limit was exceeded by twenty, the vessel became forfeited to the United States. In the estimate for the number of passengers, the crew were not included.

For a cruise across the Atlantic, sixty gallons of water (I take it for granted fresh water was meant), one hundred pounds of salt provisions, one gallon of vinegar, and one hundred pounds of wholesome ship-bread, for each and every passenger was to be provided.

The master of the vessel was allowed his discretion in the carriage of live-stock, etc. It provided for the delivery of a register of the age, sex, nationality, occupation, and the country of which it was the intention of the passenger to "become an inhabitant," as well as a register of deaths occurring during the voyage. The passenger was considered as dead freight: no note is made of cleanliness, ventilation, the daily allowance of food, its cooking, the sleeping apartments, discipline, or any thing that exhibits the least trace of care for the health of the emigrant, beyond a supply of water, not even, as I have said, described as fresh, and a monotonous diet. This state of things existed, I am led to believe, until the approval of the Act of Feb. 22, 1847, a period of twenty-eight years, when a marked advance is evident. (See Appendix II.) The emigrant is discovered to be a living and a moving being. One passenger is now given fourteen clear superficial feet of deck-surface if outside the tropics, and twenty clear superficial feet if the voyage is within the tropics; and, if carried on an orlop, thirty clear superficial feet. Here, too, the increase in area is but the faint expression of the idea that more space is needed in hot climates, and that such area must be increased if the passenger is to be carried on the dark and damp orlop deck. It was no doubt considered, that, with increased area, somehow or other increased cubic space necessarily followed. If the limit of passenger-carrying capacity was exceeded under this measurement, the penalty was the forfeiture of fifty dollars for each and every passenger, and "also imprisonment for a term not exceeding one year." If the limit was exceeded by twenty, the vessel became forfeited to the United States. If the vessel had *more* than two tiers of berths, "at least six feet in length, and eighteen inches in width, well constructed," the interval between the floor and deck was directed to be not less than six inches. Two children under eight years of age were to be considered, in estimating the number of passengers, as equal to one adult; and children under one year were not to be computed.

Here is the first evidence that sanitary legislation is needed for the protection of even a child as a passenger.

The Act approved March 2, 1847 (see Appendix III.), was a retrograde movement, as it repealed that section of the previous statute which recognized the estimate of two children under eight years of age as one passenger. It is,

however, in the Act approved May 17, 1848 (see Appendix IV.), that the greatest sanitary advance is made in a period of nearly thirty years. The passenger is now considered to be not only a living and moving, but a breathing, being.

Houses over all the hatchways leading to the occupied apartments, with doors and windows, are directed for ventilation.

Ventilators for the occupied apartments are ordered, their number, size, form, location, and capacity, in proportion to every two hundred passengers; and a proviso is made, that if other means for securing fresh air to the inhabited apartments are provided, equally efficient as those proposed in the statute, then the provisions of the law are to be considered as complied with. It is evident that sanitary appliances had already been demanded, and were in use very much in advance of the legislation. A cooking-range is directed to be placed on board for use, and its dimensions are to be proportioned to the number of passengers.

The character, variety, and quantity of food are increased, and fuel is to be furnished the cook; substitutes for the various items of the ration are suggested, and the daily amount of food to be served out is directed. There is the recognition that the passenger may, with the consent of the master, supply himself with the same food as described in the statute, or with its equivalent.

The necessity for discipline, and the maintenance of "such habits of cleanliness" amongst the passengers as will "tend to the preservation and promotion of health," is enjoined upon the captain. The apartments occupied by the passengers are to be kept clean and healthy, and water-closets in number proportioned to the number of passengers are directed to be provided for their use. In good weather the passengers are to be mustered on deck with their bedding; and the bedding is to be aired. The use of disinfectants, a notable makeshift for cleanliness always, has come to be noticed by the law-maker.

The superficial area is increased from fourteen to sixteen feet; and for the first time appears a faint recognition of the essential in all estimates for passenger-carrying capacity, cubic air-space; the height between decks is considered; and the "two for every five tons" section of the Act of 1819 is repealed. This stride — for it was not a step — was immense.

The Act approved March 3, 1849, directed (see Appendix V.) that the master or owners of vessels engaged in the carriage of passengers should "furnish in all cases to each passenger the daily supply of water," and "shall furnish, or cause passengers to furnish for themselves, a sufficient supply of good and wholesome food." This was a halting step, but none the less a step forward, and in the right direction. The improvident would take advantage, and those first venturing

"to dare an unknown sea"

would be but little calculated to determine as to the quality or quantity of food necessary for their use. The greatest advance, however, was made in the approval of the Act of March 3, 1855 (see Appendix VI.), which con-

solidated the good of all the antecedent legislation, and repealed at the same time all that was obnoxious. It reduced the tonnage for each passenger, modified the superficial space allowed, and foreshadows the distribution of passengers according to cubic air-space; the cooking of food is to be done by the vessel; the food is to be distributed at stated intervals and in definite quantities; there is a division of passengers into messes; the orlop is abandoned (let it be forever) as a passenger-carrying deck; a small hospital is provided for such as may be sick. The arrangement of berths in tiers; an inspection that the requirements of the law are complied with; a more liberal supply and variety of food; a registration of passengers as well as the deaths; the causes of, and exemption from, disease; and the application of this law to vessels propelled in whole or in part by steam, — are part of the provisions of the statute.

It also provided penalties for overcrowding. This Act is now in force, with the exception of the 13th section, which was repealed May 7, 1874 (see Appendix VII.); but, from causes beyond the ken of the writer, is utterly inoperative, as I shall show, in regard to all that relates to nautical sanitation.

The next Act in order of time to promote the welfare of the emigrant was approved March 24, 1860, and was made for the better protection of female emigrants, and is creditable to the chivalry of the framer. (See Appendix VIII.)

A bill (see Appendix IX.) regulating the carriage of persons by sea, to be known as the "Passenger Act of 1880," was presented to the House of Representatives on the 8th of April, 1880, by the Hon. Peter V. Deuster, M.C., of Milwaukee, Wis., and is the latest proposed legislation that the writer has been able to obtain. It is proposed to examine the provisions of this bill, which has for its object the amelioration of the conditions surrounding the emigrant during his passage over the ocean, from a sanitary position, leaving those points involving the jurisprudence and commercial interests affected by the carriage of living human freight for the consideration of the merchant and the legislator.

This Act proposed will of course repeal the Act of 1855, and, as stated in the outset, marks the progress in nautical sanitation, and, in consequence, is an index of the general sanitary advance of the country. Apart from the dangers to public health that may occur from the introduction of contagious or infectious diseases into the United States by the avenue of immigration, it is a matter of serious interest to the prosperity of the country that the health and lives of emigrants should be protected during their transportation by sea.

The magnitude of the interests involved may here be presented: thus, there arrived at the port of New York during the last ten years (from 1870 to 1879 inclusive) 1,561,126 emigrants, with 2,518 deaths, with a mean sea-voyage of thirteen and one-half days.

Year.	Number.	Deaths.	Year.	Number.	Deaths.
1870	212,170	450	1876 . . .	68,264	98
1871	229,639	524	1877 . . .	54,536	57
1872	294,581	597	1878 . . .	75,347	54
1873	266,818	567	1879 . . .	135,070	81
1874	140,141	238			
1875	84,560	122	Total . .	1,561,126	2,518

For the nine months ending September, 1880, there arrived at the same port 258,926 emigrants, with 172 deaths, with a mean exposure at sea of 12.7+ days.

Month.	Number of Emigrants.	Deaths.	Month.	Number of Emigrants.	Deaths.
January	5,839	6	June	43,638	19
February . . .	8,328	7	July	25,528	10
March	21,658	18	August	25,025	11
April	46,821	51	September. . .	26,839	20
May	55,250	30	Total. . . .	258,926	172

I leave the sanitary questions of their carriage by land to those whose attention may be turned in that direction; premising this much, that there is a hygiene for emigrant trains, etc., which needs examination. The path to the better protection of health and life being made known, the work of the law-maker, when not impeded by commercial cupidity, becomes comparatively easy, and is well defined. This bill, therefore, will be considered especially in its relation to the hygiene of emigrant ships.

SECTION I.

It is proposed to allot each passenger on a *steamship* — if such passenger is carried on the first deck, next below the uppermost deck, or in a poop or deck-house on the main deck — one hundred cubic feet; if on the second deck, below the uppermost deck, one hundred and twenty cubic feet; and that it shall not be lawful to carry passengers on any other than the two decks and poop or deck-houses mentioned. In *sailing*-vessels, such passenger shall be carried on a deck, not being an orlop deck, that is, next below the uppermost deck, or in a poop or deck-house built on the main deck, and is allotted one hundred and twenty cubic feet; and that the clear height between decks shall not be less than seven feet.

In computing the number of passengers that may be carried in the vessel, children under one year are not to be included; and two children between one and eight years of age are to be counted as one passenger.

These spaces are to be unobstructed by cargo, stores, or goods. For the berthing of passengers, no more than two tiers of berths shall be constructed, each berth for a single passenger to be two feet wide, six feet long; the lower tier of berths to be not less than six inches from the deck, and the interval between the tiers to be two feet six inches. Double berths are also provided, of twice the width mentioned, for married persons, females, and others specially designated. The berths are to be numbered, and are not to be taken down or removed until after an inspection. Unmarried females are to be berthed in a compartment by themselves. It is also suggested that the vessel shall have *adequate* provision for affording light and air to the passenger-decks, and to the spaces and compartments occupied by passengers, and also with adequate means and appliances for ventilating such occupied apartments. Thus, for a compartment with fifty passengers, two ventilators, each twelve inches in diameter, extending six feet above the deck, are to be provided. One ventilator is to be placed forward, and the other aft, and so constructed as to ventilate the compartment. For every fifty additional passengers occupying a compartment, two additional ventilators are to be provided.

In any steamship, the ventilating apparatus provided, or mode of ventilation adopted, which has received the approval of the "proper emigration officer" at the port or place from which the vessel clears, shall be deemed as complying with the provisions of the law in respect to ventilation.

Hatchways are to be provided for passengers, to be covered with houses or booby-hatches, so as to give as much light as possible, and to protect the passenger from rain and wet; the hatch-coamings to be one foot high.

Three methods have been used to determine the passenger-carrying capacity of vessels. The first method gave a certain number of superficial feet of deck-surface to each passenger. It is surmised that such an allotment of area may have had for its basis some vague idea of the law of density of population, — so many people inhabiting a square mile.

The second method gauged the ship's passenger-carrying capacity by the tonnage, determining the number to be carried by a varying proportion to such tonnage, examples of which have already been noticed. It has no intelligible basis whatever.

The third method — the only sanitary and scientific mode — is that of determining the cubic air-space of all the habitable compartments (excluding the orlop, for I do not consider it a habitable apartment) of a vessel, and upon this base determining with some degree of precision her berthing and passenger-carrying capacity.

The record of the cubic air-space in all the habitable compartments of vessels engaged in the transportation of passengers should, like the tonnage, become part of the vessel's register.

A fourth method of determining the passenger capacity is constantly in use

at the present time, and is based on the avarice of owners of vessels and steamship companies. This method recognizes nothing else but to carry as many as can be put on board. It has no regard for the health or comfort of the emigrant, views him only as supplying so many dollars to the bank account, and is a marine inheritance from the slave-trade, with the horrors of the "middle passage." Although carrying an excess of passengers over that allowed by law renders a vessel liable to a penalty, official reports do not show that any prosecution has resulted in the recovery of such penalty from vessels reported as violating the provisions of any Act to secure the emigrant from the evils of overcrowding. That such overcrowding, with its usual associations, takes place now, is to be seen from the following abstract from official records. At the port of New York during the nine months of 1880, from January to September inclusive, the following vessels arriving were reported for overcrowding: —

Month.	Vessel.	Nationality.	Tonnage.	Superficial Area.	Passengers by Law.	Carried.	Excess.	Deaths.	Time of Passage.
March	Main	German	3,342	8,602	601	764	163	..	13
April	City of Richmond	British	4,623	18,380	1,148½	1,257	108½	1	10
"	Donau	German	3,442	8,776	614	858	244	..	15
"	Amsterdam	Dutch	2,909	6,160	440	575	135	..	16
"	Rhein	German	3,342	8,796	629	869	240	1	14
"	Celtic	British	3,893	13,178	778	867	89	1	10
"	Devonia	"	4,270	13,186	907	1,016	109	..	11
"	Herder	German	3,418	13,066	933	1,272	339	4	11
"	Ohio	"	2,400	12,508	857	1,331	474	13	16
"	Hevelius	British	2,611	4,484	274	495	221	1	14
"	Suevia	German	3,626	10,766	757½	1,149	391½	..	12
"	Baltimore	"	2,316	13,088	818	1,192	374	2	16
May	Oder	"	3,158	10,758	751	786½	35½	..	14
"	City of Berlin	British	5,490	19,808	1,350	1,373½	23½	..	9
"	Republic	"	3,723	13,234	775	852	77	1	9
"	Frisia	German	3,448	11,388	803	925	122	..	13
"	Hapsburg	"	3,100	11,791	822½	1,000	177½	3	15
"	Main	"	3,342	10,329	706	747½	41½	..	11
"	City of Montreal	British	4,489	20,240	1,265	1,451	186	..	9½
"	Helvetia	German	4,588	20,070	1,194½	1,263	68½	..	12
"	Weser	"	3,251	10,626	743	888½	145½	..	11½
"	Westphalia	"	3,395	11,012	839	975	136	..	13
"	Salier	"	3,088	12,495	830½	1,089½	259	1	13
"	Gellert	"	3,465	13,239	907	1,075	168	3	14
"	Canada	British	4,275	16,723	1,003½	1,083	79½	1	13
"	Silesia	German	3,395	10,858	768	839½	71½	2	11
"	Donau	"	3,342	10,538	734½	815	80½	1	14
"	Egypt	British	5,089	21,421	1,279	1,386½	107½	..	10
"	Saragossa	"	2,166	7,056	441	468½	27½	..	12
June	City of Montreal	"	4,489	20,240	1,265	1,382½	117½	..	9
"	City of Richmond	"	4,623	15,520	970	1,042½	72½	..	9
"	Mosel	German	3,306	6,251	446½	593	146½	..	13
July	Cimbria	"	3,037	9,748	686½	747½	61	..	13
"	Suevia	"	3,609	10,686	752½	837	84½	2	13

In September the British steamship "Hecla," 2,421 tons, superficial area 5,320 square feet, with accommodations, according to law, for three hundred

and eighty passengers, carried three hundred and seventy passengers, of which number one hundred and fifty-nine were females, during a trip of twelve days. There were no compartments for the separation of the sexes on the steerage deck, and the steerage passengers were indiscriminately berthed without regard to sex.

Five hundred and seventy-five vessels arrived during these nine months, with one hundred and seventy-two deaths, as previously mentioned. Thirty-four of the vessels were overcrowded, with thirty-seven deaths. The mean duration of the passage across the Atlantic was 12.7+ days.

The following provisions from the statute are supposed to be in force, and regulating the carriage of passengers at the present time : —

[Revised Statutes, sect. 4252.]

"The number of such passengers shall not be greater than in the proportion of one to every two tons of such vessel, not including children under the age of one year in the computation, and computing two children over one and under eight years of age as one passenger. The spaces appropriated for the use of such passengers, and which shall not be occupied by stores or other goods, not the personal baggage of such passengers, shall be in the following proportions : —

"On the main and poop decks or platforms, and in the deck-houses, if there be any, one passenger for each sixteen clear superficial feet of deck, if the height or distance between the decks or platforms shall not be less than six feet; and on the lower deck, not being an orlop deck, if any, one passenger for eighteen such clear superficial feet, if the height or distance between the decks or platforms shall not be less than six feet; but so as that no passenger shall be carried on any other deck or platform, nor upon any deck where the height or distance between decks is less than six feet. But on board two-deck ships, where the height between the decks is seven and one-half feet or more, fourteen clear superficial feet of deck shall be the proportion required for each passenger."

By what method of reasoning, observation, or experiment, the allowance of from a hundred to a hundred and twenty cubic feet has been obtained, is unknown.

That such a space occupied by a living being is utterly insufficient for the maintenance of average health, has been demonstrated over and over again, both by experiment and physiological observation. With such an allowance of cubic space, there is but one result, — *overcrowding*.

SECTION II.

"The very word 'overcrowding,'" says Guy, "is an evidence of the frequency of its occurrence."

Overcrowding is fatal to all living beings. In the case of an emigrant ship, the overcrowded are exposed to the poisonous influences of the excrementitious matters from their lungs and skin, and from a want of an ample supply of fresh air. Under such circumstances there is an immensely increased liability to the reception and spread of contagious and infectious diseases; and it is in overcrowded ships that cholera, relapsing fever, small-pox, and

more especially typhus or ship fever, has most frequently occurred. Of the other diseases produced by ochlesis, or crowd-poisoning, continued fevers, boils, erysipelas, malignant ulcer, ophthalmia, pyæmia, septicæmia, bronchitis, consumption, and a general impairment of the health must be mentioned.

Of the hundred and seventy-two deaths in the nine months of 1880, from January to September inclusive, seventy-three were from affections of the respiratory apparatus.

There is no more well-determined sanitary law than that which recognizes the relation between density of population — i.e., the number of persons inhabiting a certain area — as a cause, and disease and death as a consequence.

"The nearer people live to each other, the shorter their lives are," says Farr. "Thus, in round numbers, when we stand on an average four hundred feet from each other, we live on an average fifty years; when we come within sixty feet of each other, we live but thirty years; and, when we are but twenty feet off, we live but twenty-five years." It is not likely, that, by increasing the interspace over four hundred feet, we could prolong our lives; but it is easily seen, that, if we reduce such interspace, we can readily reduce the mean of years of life to even minutes, and to nothing. Soldiers have been suffocated in the ranks when massed together in the open air, not from the physical pressure, but from overcrowding, preventing free access of air. It is not the crowd that kills; it is, in the case of a ship, the accumulation of vaporous and other excreta that sickens, and increases the mortality.[1]

The Black Hole of Calcutta gave twenty-two cubic feet.[2] Pacific mail-steamers give to a cooly in his transit of the ocean fifty-five cubic feet; and even some naval vessels approach these small figures, which are the indices of overcrowding. The wonder is, that emigrants do live under the circumstances. It is fortunate that this troglodyte existence between decks has become much shortened by steam-vessels; for, taking the death-rate as the exponent of the influence of such unsanitary surroundings, it is evident that vessels making the shortest passages, other things being equal, have the smallest death-rate; and this rate does not as yet appear to have any relation to the materials of construction of the vessel as to being of wood or iron.

Dr. J. M. Woodworth, in his paper on "Some Defects in the Immigration Service," exhibits this fact statistically —

	1867.	1872.
On sailing-vessels	1.167	.542
On steamships	.103	.045

as the respective percentages of mortality, and for the classes of vessels named.

Rapidity of transit, therefore, has this sanitary value, that the shorter the

[1] It may be safely said that overcrowding on shore has less hazards than the same degree of overcrowding on ship-board.

[2] The regulations of the Ottoman Empire give to a pilgrim to Mecca, when transported in a steam-vessel, fifty-four cubic feet of space; and in sailing-vessels seventy-two cubic feet is the minimum allowance.

time of exposure to the overcrowding, the less is the acute danger to the health of the emigrant.

The report of the Hon. Hamilton Fish to the United States Senate in 1854, upon the causes of sickness and mortality on emigrant vessels, is mainly devoted to demonstrating the fact of overcrowding as the most prominent of the causes for such sickness and mortality. This evil exists, as has been shown, even to the present day. Mr. Fish, in the report, states that the opinions furnished the committee as to space were in a high degree conflicting; some of them being in favor of the sufficiency of the provisions contained in the laws then in existence, and others proving them totally inadequate: the antagonism of opinion being founded on opposing interests.

In the calculation of the air-space for each passenger, it should be remembered that an adult displaces 2.26 cubic feet, and also that an allowance should be made for the cubic space occupied by the wood or material used in the construction of the berths. For example, a vessel carrying one thousand persons has 2,260 cubic feet of air-space displaced by their bodies alone, equal to the amount under existing law to the space allotted to nearly twenty-three people.

The Fourth National Quarantine Convention, which met at Boston in 1860, formulated the sanitary law that should guide legislation upon the passenger capacity of all vessels in the following words: —

"But in no case should the number of individuals to be accommodated on any vessel, or in any apartment provided for the accommodation of crew or passengers, exceed in ratio one individual to every four hundred cubic feet of air-space, together with provision for effectual ventilation in all weathers."

Upon experimental data, Tidy gives his opinion that "three hundred cubic feet is the very minimum per head in sleeping-rooms, and with this minimum thorough ventilation is implied."

There is an overcrowding in existence on emigrant vessels at present; and unless the existing passenger Act is enforced, and is not a mass of words in the statute book, a recurrence of the horrors of the "Larch," the "Avon," the "Virginius," the "Leibnitz," and other vessels, may awaken the dormant and spasmodic philanthropy which now permits human beings to be huddled together with less care than is given to our brethren the brutes. From a sanitary and physiological outlook the law is defective in assigning one hundred to one hundred and twenty cubic feet for each passenger.

It rests on the cupidity that rents a pen of one hundred cubic feet for a few days at a set price, such as no farmer doles out to his cattle.

As the minimum, four hundred cubic feet should be allotted to each passenger, with thorough ventilation.

Two children under eight years of age, it will be observed, are to be enumerated as one passenger. It is hardly necessary to state, that, in the young, tissue metamorphosis is exceedingly great and rapid, and that to these changes must be added the influence of growth; for adult organs in a child would be pathological in character. When it is evident that there is a physiological necessity for pure blood and necessarily pure air, the cell-building needs to be

perfect in character, else the structure is defective. In addition to this, the causes of the enormous mortality of children under five years of age on shore must be considered as more than increased by the conditions under which they are placed in a crowded steerage at sea. These facts are sufficient for the sanitarian to ask the abolition of this clause. All children, no matter what the age, should be counted in the enumeration for the division of cubic air-space. There should be no limitation for the little ones: fresh air is essential to their lives and proper development.

SECTION III.

The air, as is well known, is composed of two gases, oxygen and nitrogen, mechanically mixed with an appreciable quantity of carbonic acid gas, and varying amounts of watery vapor and organic matter. This is the food of the blood, conveyed to it by the lungs at the rate of twenty cubic inches from sixteen to twenty times per minute.

By this air also the whole integumentary system is constantly bathed. Cut off the supply for a few minutes to either lungs or skin, and the person perishes. Now, these organs, the skin and the lungs, return to the air as excrementitious matters, carbonic acid gas, watery vapor, and organic matter, to the respective average amounts in twenty-four hours, from the lungs 12,146.15+ grains Troy. This amount of excrementitious matter exceeds that from the kidneys and alimentary canal, the average amount of such matters from the kidneys being in twenty-four hours 20,039.80+ grains; that from the alimentary canal 2,337.33 grains, — a total of 22,377.19+ grains, or 50.76+ ounces Troy. These excreted matters are alike in character. In one group the excreta are in mass, in the other vaporous. How far this subdivision in a state of vapor renders them less noxious or hastens their destructive metamorphosis by the ordinary process of oxidation, is yet to be accurately determined. The mere fact of aggregation, however, does not render them less offensive or toxic in their effects upon the economy.

Defective ventilation is slow blood-poisoning: poisoned blood is defective nutrition, mal-assimilation, and all the evils that follow. It has been determined by experiment that an adult vitiates, by the respiratory act *alone*, fifty cubic feet of air per minute; that is, renders fifty cubic feet of air unfit for respiration: and it can readily be seen how quickly the one hundred or one hundred and twenty cubic feet to each passenger in a compartment becomes totally unfit for respiration, from its filthy, poisonous, disgusting character.

The interval of time becomes very materially reduced when the action of the skin is added to that of the respiratory system.

Such a food for the blood is alike in character to the stercoraceous meal wherewith Rabshakeh is said to have appeased his hunger.

I have elsewhere given the facts of physiological experiment, upon which is founded the opinion that the lungs can only fulfil their function to the blood by an unlimited supply of pure air.[1] To furnish this supply, or even a fair

[1] The following factors should be borne in mind in this connection: The average number of respirations is from sixteen to twenty per minute, and about twenty cubic inches

average, to the passenger compartments of a vessel, appears to be beyond the mechanical skill of the ship-constructor to secure; and, even accepting the provisional amount of cubic space as given by Tidy, — i.e., three hundred cubic feet, — it seems as yet an unsolved mechanical problem to thoroughly ventilate such space on ship-board.

Men have been asphyxiated in the holds of vessels by the accumulation of CO_2. Thus Dr. D. B. Reid quotes the following incident, occurring in H.M. ship "Minden," at Trincomalee, in 1819–20: "A boatswain's mate was ordered to see the pump-well swabbed out. A man went down with bucket and swab; but as he neither filled the bucket, nor answered when called to, a second man went to see what he was about. He refused to answer. Three more ventured, and they also remained silent. A light lowered went out about six feet above the men. They were extricated, and none recovered their usual health."

Presuming the ventilators to be air-shafts, it is easily demonstrated how utterly inefficient such means are for the ventilation of a compartment inhabited by fifty human beings. Two ventilators, each twelve inches in diameter, and extending six feet above the deck, have each a cubic capacity of 4.712+ feet, or 9.424 cubic feet in the aggregate.

Grant that the hatch has a much larger area for the ingress of air, consider both ventilators as educts, and assume the temperature of the compartment and that on deck to be the same, and let us see how soon these ventilators will remove the air.

Fifty passengers, with one hundred cubic feet, give five thousand cubic feet. This air is vitiated at the rate of twenty-five hundred cubic feet (50×50) per minute, or in two minutes the whole mass is rendered unfit for respiratory purposes by the respiratory act alone. Now, the capacity of both ventilators is 9.7214 cubic feet, — say ten cubic feet; and they must deliver their contents five hundred times in two minutes, two hundred and fifty times in one minute. Now, ten cubic feet moving at the rate of six linear feet two hundred and fifty times in one minute of time, omitting the element of friction, equals a rapidity of movement of the air of seventeen miles the hour. This simply relates to the change in the quantity of air.

The experiments of De Chaumont demonstrate the great difficulty of securing in any enclosed space purity of air at the normal of .04 per cent of CO_2. He found, that, placing the respiratory impurity by CO_2 at six cubic feet per hour, a man placed in a room of one thousand cubic feet of air must receive there one million cubic feet of outside air in an hour, to reduce the CO_2 impurity to the normal of fresh air.

How little these ventilators would effect the necessary changes in the quality of the air in a space of five thousand cubic feet, with fifty passengers, is very

of air are taken in at each inspiration. The average pulsation of the heart is from seventy to seventy-five per minute, and about two ounces of blood are propelled from the heart at each beat. In other words, twenty-four thousand cubic inches of air are necessary, other things being equal, for five hundred pounds of blood circulating through the lungs in one hour of time.

readily determined. Besides, it must not be forgotten that the aggregation of persons also increases the respiratory impurity in a degree as yet undetermined. It is not to be expected, therefore, that the air of between-decks can be as pure as the external air. But the statement of such a fact is no argument for abandoning all effort to secure as liberal a supply of fresh air as is possible.

Considering all the circumstances presented, this is a physical impossibility in the proposed apparatus, and can only be obtained by the intervention of other mechanical means.

In steamers, the approval of the apparatus provided or made, adopted by the "proper emigration officer," is not of much weight in a sanitary point of view, unless it is known that such officer has more knowledge of the means of ventilation and its purposes, or presents the evidence of the rate of flow of the air by the anemometer, or its purity as measured by the CO_2 test. Life, however, as Southwood Smith said, is a more delicate test than chemistry of the purity of air.

I may here remark that the inspection of the sanitary arrangements supposed to exist under the law rests in no one's particular province; and, whilst I do not for a moment arrogate all sanitary knowledge to the exclusive use and behoof of my profession, I do ask, in all instances, that medical men be consulted upon such matters, as they rightfully belong to the most important division of the science of medicine made in modern times, — i.e., that of preventive, as distinguished from curative, medicine. In this demonstration of the physical inability of the proposed means of ventilation, the emigrant has been considered in a state of rest; if at work, — say performing work equivalent to walking one mile an hour, — the respiratory impurity, as measured by the amount of CO_2 expired, is doubled, and the necessity for pure air is more than doubled.

Craig, taking the amount of CO_2 as the exponent of the filthiness of the air, and considering that sea-air has a normal of three parts CO_2 in ten thousand, found on steamers with artificial means of ventilation, carrying emigrants, from 6.69 to 13 parts in ten thousand in the air between decks. The external air, examined at the same time for comparison, gave from 2.5 to 2.73 parts in the ten thousand. He gives, as the limit, six parts carbon dioxide in ten thousand.

Ventilation should not only extend to the passenger compartments, it should be effective in every enclosed space on a ship. The hold, bilges, and limbers call for such ventilation. More particularly, however, is intercostal ventilation demanded; that is to say, ventilation between the frame-timbers. These spaces become long tubes closed at one end by the keelson; two sides formed by the timbers, the outer side by the planking, and the inner by the ceiling. These tubes are considered by many to ventilate the bilges having the upper aperture in vessels of war opening under the hammock-rail, or more frequently opening into the ward-room state-rooms by slots cut in the shelf-piece. Their principal use has been and still is to conduct foul gases arising from the bilges into the sleeping apartments; or more frequently they become the receptacles of all sorts of unimaginable filth, and consequently the cause of the frequent

outbreaks of filth-diseases on ship-board. As ventilators, they belong to the uncorked bottle genera, and are of no value save for harm.

To secure this essential to life to the emigrant, I know of no more efficient apparatus than a modified Napierian plan of ventilation, — a system of tubes connecting every enclosed space, and extracting the air by exhaust-fans driven by steam. It is the only system known that will furnish, to those living in enclosed spaces, air approximating at least to the same degree of purity as that external to the apartment.[1]

Reid utilized these intercostal spaces in his method of ventilating vessels, and to-day the hints of that far-seeing observer are accomplished facts in the ventilation of ships. The passenger spaces of a vessel with an open hatch alone are about as well ventilated, as previously remarked concerning the intercostal spaces, as an uncorked bottle or a deep well.

Griffiths states that we cannot have natural ventilation on ship-board, or a healthy vessel, where the limbers are eleven feet below the water-line; and he fixes, on physical data, eleven feet draught as the health limit. He also states that no vessel in which human beings are to dwell should have a depth of hold of over sixteen feet. At sea the motion of the vessel does not move the air much beyond the hydraulic action of the waves.

Some observations of my own lead me to consider, that, in a vessel at sea, with only one hatch open, the influence of the oscillations of the vessel upon the movement of the mass of the air in the hold is not felt much beyond fifteen feet in any direction from the hatch. Even if the vessel is at rest, the air blowing over the hatch has but little aspiratory power. The same effect is observed in winds blowing over wells, not affecting the accumulations of CO_2 at certain depths.

I am informed by Lieut. Z. L. Tanner, U.S.N., that on the large steamers on the Pacific, with their cargoes of one thousand Chinese, a perfect ventilation is maintained by a steam-exhausting ventilating apparatus.

All vessels engaged in the carriage of passengers should be fitted with some form of ventilating apparatus of the exhaust-plan, worked by steam. It would simply be cumulative work to note the practical and judicious opinion of every sanitary observer upon the necessity for the better ventilation of ships, and more cubic space to prevent overcrowding.

It is difficult, perhaps impossible, to discriminate between the etiology of the production of disease by overcrowding and that by foul air.

All writers upon the subject, however, are agreed upon their disease-producing effects.

At the port of New York from Sept. 1 to Dec. 31, 1853, a period of four months, there arrived 312 vessels from European ports, carrying 96,950 emigrants; the average passage was 41 days. Of this number of passengers 2,158 died, and 457 were landed sick. The death-rate for that period was 22.2+ per thousand.

[1] Any system of ventilation, however, that does not get rid of bilge-air is worthless, from a sanitary point of view.

Bell's figures are as follows: In ten years, from 1863 to 1874 inclusive, there arrived at the port of New York 6,733 vessels, carrying 2,321,557 steerage passengers. The total deaths were 6,241; the ratio of deaths of steerage passengers being at the rate of 27.8 per thousand.

In the "Ohio" (2,400 tons) in April of this year, 1,331 passengers were carried. The deaths 16, at the rate of 12 per thousand for the 16 days of the passage.

It may not be out of place to call the attention of the merchant from his living freight to the inanimate cargo consigned to him, and to state the fact, that in ventilated vessels the cargo is preserved more effectually from damage than in the unventilated. I have it from good authority that the cost of an automatic ventilating apparatus placed in a sailing vessel was more than repaid by the saving made in preventing the "sweating" of a cargo of coffee from Rio de Janeiro to Baltimore.

SECTION IV.

The proposed statute directs a properly located caboose or cooking-range or other cooking apparatus, the dimensions and capacity of which shall be sufficient to provide for properly preparing and cooking the food of passengers. This is an advance in sanitation that cannot be readily estimated when it is considered, that, but a few years ago, emigrants had to cook their food themselves. In steam-vessels, cooking is now done by steam; and there is no objection to the preparation of food by this means. The food to be supplied is to be equal in quality and quantity to the naval ration. It would be better to direct that the naval ration should be the same in emigrant vessels, — one ration to each person per diem.[1] Several reasons can be cited for the adoption of the naval ration. By government inspection the full quantity and good quality of its components are secured, and its nutritive value has been determined. A good ship's cook should be allotted to each vessel as part of the "*officiel*," who should arrange a daily bill of fare for the passengers. The direction that the meals be served on tables, and three times a day at regular and stated hours, is also an advance in the care for the comfort and health of the emigrant. The allowance of water — three quarts per diem — is too small. At the lowest estimate, one gallon per diem of fresh water to each passenger should be provided.

In steamers with a distilling apparatus, the supply should not be limited, and no waste of water permitted. An apparatus for the distillation of fresh from sea water should be placed on all passenger-carrying vessels, either propelled by sails, steam, or both combined; and the water should be carried exclusively in iron tanks.

Mothers with infants and young children are to be furnished with wholesome

[1] It is to be stated, however, that the full amount of the naval allowance of food is more than sufficient for a single passenger. In the naval service the messes of a ship's crew can commute their allowance at a rate not exceeding two rations for every ten persons.

milk, or condensed milk, for the sustenance of the children. Now that meal-hours are to be fixed, a ration established, and the cooking done for the emigrant, it requires but a slight advance to group the passengers into messes, with a mess-man, to have a stated time for serving out provisions, and to secure a discipline that is sanitary in character.

The daily distribution of the naval ration for a week is as follows: —

	Biscuit.	Beef.	Pork.	Preserved Meat.	Flour.	Rice.	Dried Fruit.	Pickles.	Sugar.	EITHER— Tea.	EITHER— Coffee or Cocoa.	Butter.	Canned Tomatoes.[1]	Beans.	Molasses.	Vinegar.
	OZ.	POUNDS.					OUNCES.							FRACTION OF PINT.		
Sunday	14	..	..	¾	..	½	..	..	4	⅛	2	2	6	..	..	..
Monday	14	..	1	..	..	..	..	..	4	⅓	2	..	..	½	..	..
Tuesday	14	1	..	..	½	..	2	..	4	½	2	..	..	..	..	..
Wednesday	14	..	1	.	..	..	..	4	4	⅓	2	..	..	½	..	..
Thursday	14	..	..	¾	..	..	..	..	4	⅓	2	2	6	..	½	..
Friday	14	1	..	..	½	..	2	..	4	½	2	..	..	..	..	..
Saturday	14	..	1	..	..	..	..	4	4	½	2	..	..	½	..	½
Weekly quantity,	98	2	3	1½	1	½	4	8	28	3½	14	4	12	1½	½	½

Fresh or preserved meat may be substituted for salt-beef or pork, and vegetables for the other articles usually issued with the salted meats; allowing one and a quarter pounds of fresh or three-quarters of a pound of preserved meat for one pound of salted beef or pork, and regulating the quantity of vegetables so as to equal the value of the articles for which they may be substituted.

For long voyages the naval ration is well fitted, as I have elsewhere stated when giving its histogenetic and thermogenetic value. Potatoes, cabbage, beets, carrots, onions, and other fresh vegetables, as well as fresh meats in cases packed in ice, can be carried in sufficient quantities on steamers to last at least during an average passage across the Atlantic. Eggs, fowls, and condensed milk should also be carried for the use of children and the sick. Dried fruits can also be added to the ration.

SECTION V.

Two compartments for hospital uses are provided for: one for males, the other for females, to be located on the main deck, or deck next below the uppermost deck; to have eighteen superficial feet in the clear of the deck for every fifty passengers carried; to be furnished with proper beds, bedding, and utensils, and kept filled and supplied during the voyage.

This allowance of space for hospital accommodation is too small, and is founded upon random guesswork. Observation has taught me that the proper

[1] Desiccated potatoes abolished by Act approved May 3, 1880, and canned tomatoes substituted.

method of arranging hospital areas, and perhaps the determination of medical supplies on ship-board, is to be attained by an inspection of the sick-rates in passenger-carrying vessels, under the varying influences of the character of vessel, locality, number of persons carried, season, length of voyage, etc. Accepting such a standard as the sick-rate, and bearing in mind that the cubic air-space for a well person must be multiplied many times for the sick, I do not think that less hospital accommodation than in the proportion of three beds for every hundred passengers carried should be permitted. The writer is fully aware of the nature and extent of the demand thus made, and that it may be by many considered impracticable; but the history of epidemic outbreaks of disease on ship-board exhibits the fact that Dame Nature, when driven to extremes in this direction, is apt to assert herself, and solve the alleged impracticability by a wholesale slaughter, in which, upon her own terms, she secures in some degree indemnity for the past, as well as a certain amount of security for the future.

Every vessel carrying over fifty passengers, other than cabin passengers, shall carry a duly qualified and competent medical practitioner or surgeon, who is to be provided with surgical instruments and medicines proper and necessary for the diseases and accidents incident to sea-voyages, and "for the proper medical treatment of such passengers, and with articles of food and nourishment as may be proper and necessary for the preservation of the health and lives of young children."

Whilst giving a qualified assent to all the means mentioned for the care of the sick, exceptions must be taken to the *rôle* proposed for the medical officer on board. His services are to be, and there can be no question but that they would be, promptly given in any case of sickness or disease occurring on ship-board.

Evidence should be presented by a person applying for the position of medical officer that he is a graduate of some reputable college of medicine. The medical officer of any vessel should be the sanitary officer by law, and not upon sufferance. Preventive medicine is the greatest part of his vocation, and curative medicine involves but a fraction of the professional responsibility. The responsible duty of caring for the sick when disease has shown itself, clothes him with the authority to prescribe a remedy, to arrest the hemorrhage from a wounded artery, to bind up a broken arm, or amputate a shattered leg; but when it comes to intrust him with the like responsible duty of observing and guarding against the causes of diseases, both within and without the vessel, in all latitudes, seasons, and climates, not the shadow of authority is allowed him to enforce a sanitary law.

Even suggestions as to cleanliness, dryness, ventilation, water-supply, clothing, food, etc., are considered as affecting that unknown quantity called the discipline of the vessel, as derogating from lawful authority or prerogative, and are more frequently ignored and utterly disregarded than accepted and executed.

The sanitary suggestions of the medical officer should be carried into effect

by legal authorization. The responsibility for his acts in these respects is professional, and a part of the jurisprudence of medicine.

By decided legislation the medical officer of every vessel should be in charge of its sanitation and sanitary police. To prevent him exercising this most important part of his calling, is to maim him professionally. I speak of that which I know, when stating that I have met, in the course of my sea-going, adamantine ignorance of the results of the violation of simple sanitary laws, coupled with a mule-like obstinacy toward the arrest of such results, even when the benefits to be obtained were demonstrated by the plainest facts of physical science. I cannot place this matter too strongly.

Ironically speaking, a naval pronunciamento states that the lives and health of men are not to be intrusted to incompetent medical hands, as a reason for a severe and exhaustive examination into the qualifications of a candidate for so-called medical honors.

But no matter how great the skill, how extensive the knowledge, how accurate in suggested means for preventing disease, he is at present powerless to execute, still less enforce, the plainest teachings of preventive medicine on ship-board. *Every tyro in maritime sanitation soon learns to recognize the fact, that most of the causes of the morbility and mortality to which his professional attention is called are to be found in the condition of the ship, rather than that of the passengers and crew.*

It is to be hoped, that, with the advent of a medical officer on merchant passenger vessels, he may be clothed with authority to have executed a thorough system of sanitary police; that the medicine-chest, with its small volume of the "Principles and Practice of Medicine," with short and easy rules for prescribing, usually found in the care of the mate, will be placed in the proper hands; and also the overcrowding, filth, wet decks, bad food, worse ventilation, etc., that rendered the chest a part of the necessary outfit, may be numbered "amongst the things that were."

Those who are sick should be cared for with more than ordinary attention. Stewardesses employed by the vessel, and made part of the complement, should be directed to look after sick women and children. The sick in hospital should be visited at nine A.M. and five P.M. daily, and as much more frequently as is necessary, by the medical officer, and removed to upper deck if it be deemed advisable. A list of the names of the sick and their diseases should be given to the captain at a daily morning inspection, and the number of sick entered upon the ship's log, as well as the name, sex, nationality, etc., of any deceased.

It should be remembered, that, for most of the voyage, the steerage is a hospital filled with sea-sick people.

In the event of the occurrence of any contagious disease, isolate the case, and use such other means to arrest the spread as the nature of the disease may require; for example: vaccinating all hands if small-pox breaks out; place under observation all diarrhœal cases in the event of cholera making its appearance; disinfecting dejecta, with the destruction of clothing, bedding, etc.

As the sanitary officer of the vessel, the medical officer must be eternally vigilant and active, arresting at once, as far as possible by preventive measures, the approach of disease by any avenue. All such measures should be well considered before sailing, and not postponed to "a more convenient season."

"He who walks in the street of by and by will stop in the house of never," reads a Spanish proverb. He must be a patient man; for much of opprobrium and contumely will be heaped upon him for all his work. It savors of interference; yet it must be remembered, that, in the time of no danger, danger is imminent. More than likely he will be regarded as an alarmist, and he will be sorely tried; for, if no need of his service appears, his functions are valueless. If, perchance, such need does occur, then his sanitary precautions were useless.

Such has been, and still is, the reasoning of ignorance.

SECTION VI.

In every vessel carrying passengers, there is to be two water-closets or privies, and an additional one for every one hundred male passengers on board, for their exclusive use; and an additional one for every fifty female passengers on board, for the exclusive use of themselves and children. These are to be properly enclosed, and located on each side of the vessel, separated from the passenger compartments by substantial bulkheads, and kept in a cleanly and serviceable condition throughout the voyage.

There is but one sanitary law for all such modern conveniences, — cleanliness, with an unlimited supply of water for flushing. This provision in the Act for the health and comfort of emigrants might, with great propriety, be added to the naval constructor's stock of knowledge, and add to the health and comfort of the crews of government vessels. It would remove, however, another nuisance, handed down from the good old times, — the present location of "the head."

These necessities should be placed under the forecastle, freely ventilated, and made accessible at all hours. At present they are dangerous to life and health, subjecting men to exposure in all weathers, are unenclosed, unsightly, and unhealthy.

The hygiene of all such places may be summed up in a word, — cleanliness.

SECTION VII.

The master of the vessel is authorized to maintain good discipline, and such habits of cleanliness among the passengers as will tend to the preservation and promotion of health. Such regulations as he may adopt are to be posted and kept up in places accessible to the passengers. The compartments and spaces are to be kept at all times in a clean and healthy condition, and are to be disinfected with chloride of lime at the discretion of the captain.

Elsewhere an opinion, based upon some observation, has been expressed upon "the usages and customs of the sea-service," which now rejoices under the name of — discipline.

Not a day passes but the press reports some outrage committed upon the

crew or passengers of merchant vessels. Of their brutal nature, one has but to refer to the facts published by Jewell, Dana, Roche, and others. That they are growing less frequent, I have every reason to believe; but that they exist to a much greater extent than is supposed, is also true. In the hurry and excitement of landing in the New World, the remembrances of wrongs committed upon him are apt to fade in the heart of the new-comer. In finer natures than that possessed by the average emigrant, even the injuries and asperities of a cruise grow dim and softened as the flag comes down, the vessel goes out of commission, or passengers wend their way to their respective homes; and so no note is taken of suffering, privation, insult, or injury.

To aid the captain of every passenger-carrying vessel, he should have authority by law to enforce the bathing of the bodies of all emigrants, weather permitting; and he should also see that they should remain on deck, in spaces allotted for them, during as much of daylight as possible. More especially is this desirable on the part of mothers with young children, a growing child demanding for its proper growth all the fresh air and light possible. The hair and beards of the male passengers should be kept cleanly cut. Each emigrant should have a change of under-clothes, and facilities afforded him for washing and drying them during the voyage.

The captain having his share of duties, the passenger should be made to do his part by a ready obedience to all the orders issued for the preservation of his life and health.

Concerning the cleanliness of the compartments, there is an absolute necessity for their being scrupulously clean.

Dr. Griscom thus portrays the steerage of the "Ceylon" in 1847: "The indescribable filth, broken utensils, and *débris* of food scattered recklessly about. Some were just rising from their berths for the first time since leaving Liverpool, having been suffered to lie there all the voyage, wallowing in their own filth, . . . a picture of which neither pen nor pencil can convey the full idea." Or, at a later date, Judson, in 1870, in his report: "It is difficult to convey in words an idea of the filthy condition of the passenger decks on some of the finest emigrant steamers arriving at New York. The best moment for inspection is, when the passengers have departed with their baggage. All the unclean material which neglect has allowed to accumulate in and under and around the berths is then brought to light. The berths and bulkheads are then seen to be dirty and greasy; the air is foul and offensive; the deck is black and slippery with muck, and encumbered with fragments of food, soiled bedding, discarded utensils, and filthy, cast-off garments." Or the following pen-picture from "Blackwood's Magazine:" "Part of the 'Highlander's' cargo was five hundred emigrants, to accommodate whom the between-decks were fitted up with bunks, rapidly constructed of coarse deal, and having something of the appearance of dog-kennels. Graphic indeed is the picture of the steerage when the malignant epidemic breaks out, and it becomes a lazar-house, frightful with filth and fever; until, at last, favorable breezes came, and fair, mild days, and fever-feed and the human stable (for it was no better) was cleansed."

Still later, a writer in 1874 characterizes the steerage as "a foul-smelling dungeon."

Yet the Act of 1855 remains unexecuted on the statute-books. Ships in the above condition are disgraceful alike to captains and owners. Judson's opinion, that "neglect" is a cause for this condition of affairs, is indorsed by Sanders (1874), who characterizes the disposition of the officers of these ships as marked by indifference, rather than by any more active feeling. It is a wonder that the emigrant lives at all under such conditions.

Place such as a question, and the only answer is, that such subjects take on for the time a degraded type of being, which is compatible with existence under such circumstances.

Lamport (Soc. Sc. Trans., 1860) says that deficient sanitary conditions become innocuous to the lower physical development. Besides, living under such circumstances is not conducive to long life. Perhaps the antecedent surroundings of the life of the emigrant have not been far removed from that into which he is thrust in his exodus to the new world. Indeed, much of the discomfort amongst emigrants arises from their ignorance and previous modes of life. Many of them have left hovels, and the relief for even a few days from care plunges them at once into a state of indifference.

The manner and time of securing this proposed cleanliness of the decks, however, are important. It is usually performed in the morning watch by sluicing the decks with water, without regard to any other circumstances whatever. The passenger-carrying decks should be kept, as stated, clean and dry. The decks should be scraped, rather than holystoned, but kept dry.

The instructions for the medical officer in charge of convict ships, when such vessels were in existence, read as follows: —

"As it is very essential that damps should be prevented by every practicable means, he is to cause the swinging stoves to be frequently used in different parts of the ship for the purpose of promoting warmth, dryness, and a circulation of air." And it is to be remarked, that, in these vessels, where "the greatest cleanliness" was to be observed, it was obtained by scraping the deck, wiping it up with hot water, swabbing, etc., — never by the thoughtless use of an unlimited amount of water. Certainly, it is not too much to ask the same consideration for sailor and emigrant.

"At all times the utmost attention should be paid to keep the ship between decks as dry as possible, by means of stoves properly fitted, . . . by frequent swabbing, by keeping up a free circulation of air, and every other possible means." And, in a general summary upon the rules and medical discipline on board the Honorable East India Company's ships, Stewart says, "The utmost possible attention, in every respect, should be paid to cleanliness, dryness, and ventilation." [1]

[1] Gordon, in calling attention to the rules to be observed for the protection of the health of troops on voyages, states that "the pernicious custom of washing the lower decks should be restricted according to the state of the weather, and scraping and dry rubbing be almost invariably adopted instead;" and further states, that "washing between the decks should

Sir Gilbert Blane, in 1781, in a memorial to the British Board of Admiralty upon the causes of diseases in ships, placed, as first in importance, "the neglect of cleanliness, ventilation, and dryness in the interior economy of ships;" and, in commenting upon the causes of the improvement in the health of the navy from 1793 to 1811, assigns "the better observance of cleanliness, ventilation, and dryness."

Elsewhere I have expressed opinions, founded upon observation and experience, upon the humidity of vessels as an etiological factor in the production of disease, and shown how much excessive dampness on ship-board is due to the indiscriminate sluicing of the decks with water for the asserted purposes of cleanliness. Cleanliness can be secured without the constant drenching of the decks.

There is but one opinion, founded upon the recorded observations of over a century, that "a damp ship is an unhealthy ship;" and the evidence accumulates, that the deep has fewer perils compared to this peril of the ship. The practice of *daily washing down of decks* is held to at this day with a tenacity that exceeds belief. It has been stated that the cleanliness asked for cannot be obtained without water. The answer to that statement is, and it is made from record, that either there is too much dirt to the water, or too much water to the dirt. Indeed, all the devices that ingenuity can conceive of, or twaddle uphold, have been successfully used to maintain this nuisance intact to this day. Physical demonstrations, deductions from clinical observation, and the accumulated experience of centuries have been all alike powerless to place within sanitary limits this daily deluge on the decks of vessels.

It may not be possible to fix in advance the time for inundating the decks, which "should be restricted to the demands of necessity," as Wilson (R. Navy) has stated. It should be determined upon, however, by the most favorable circumstances for securing afterwards their dryness, as a clear, warm, dry day; and to accelerate the drying, hot water, hot sand, and the drying-stove, with free access of the air, should all be called into requisition. In the daily attempt to render the decks clean by the excessive use of water, ships have been rendered more unhealthy than they are from their construction. Dry cleaning should be preferred to cleaning by any means in which water is employed.

In the distribution of that traditional peck of dirt said to be allotted to every human being, I ask for the sailor, the emigrant, and myself, permission to take the share — dry.

When water is added to filth or decaying organic particles, the mixture is prepared for fermentation.

Simon says that "moisture is the normal condition of all ferments." Hun states that "there is probably no more prevalent cause for disease than dampness under such circumstances." "It is not surprising," says the same writer,

take place only once a week, and then only when the weather is dry. Scraping and dry rubbing should be sufficient to maintain the decks in a state of cleanliness, and be strictly enforced every day."

"that the question, both from scientific and clinical observation, has of late pressed itself upon us, whether consumption and other lung affections, rheumatism, diphtheria, and zymotic diseases in general, do not owe their incubation and propagation more to superabundant moisture than to superabundance of filth." Coincident with the resumption of the holystoning is the rise in the sick-list of the U. S. S. "Richmond," as stated in the report of the Surgeon-General of the Navy for 1879.[1]

In wooden ships the decaying vegetable matter or rot of the ship, a temperature of 80° Fahrenheit, and moisture, produce a veritable "*air-marécageux*," — marsh-air, malaria; and, in this connection, dry rot may be considered as a cause of disease on ship-board. It is a demonstrated fact, that the constant wetting of the decks, and the excess of carbon dioxide in the air of the holds of ships, promotes the decay and rot of the timbers. It is also known that the excess of carbon dioxide in the air influences very much the forms of fungus growth; for it promotes the development of certain spores which will not grow except in the presence of an acid solution, or such excess of carbon dioxide in the air.

"Dry rot," says Denton, "which owes its name rather to the effect produced than to its cause, — a dreaded enemy, generated in a damp, close, and dark atmosphere, — when once in existence, seems to rise with extraordinary rapidity from its bed, and to spread vigorously through timber in all situations, dry or damp, dark or light."

The spores that are present in woody matters develop as soon as these circumstances obtain; and, as they increase by their growth the amount of carbon dioxide in the air, they thus increase their tendency to grow, and also accelerate at the same time, in a rapidly increasing ratio, the tendency to rot and decay. Wood kept always wet or always dry has a prolonged life; but the same wood alternately exposed to damp and warmth is rapidly affected by dry rot.

In June, 1879, I imitated these conditions partially in an improvised culture-cell, and studied the changes under low powers of the microscope. Some of the spores seem to grow very rapidly when moistened at normal temperature with the ordinary carbonic-acid water of the drug-stores. The subject, however, deserves to be studied by an expert microscopist and mycologist, and one who has given attention also to the development as well as the generic differences of the fungi.

Dry rot will also proceed with astonishing rapidity in any close confined situation where the air is filled with aqueous vapor, and without currents.

[1] Confirmatory of the opinions, founded upon physical observation, concerning the disease-producing effects of humidity, expressed in my report upon the hygiene of the U. S. S. "Tennessee" in 1875, and also in a pamphlet on "Air and Moisture on Ship-board" published in 1879, are the results of the observations published under the direction of the Surgeon-General of the Navy, in the report of the honorable Secretary of the Navy for 1880, and which are based upon the records of meteorological observations on ship-board, which I had the honor to inaugurate during the term of office of ex-Surgeon-General W. Grier, U.S.N.

This dry rot is a fungus known as *Merulius lachrymans*, and is described by Greville as follows: "Large, fleshy, but spongy, moist, ferruginous yellow, arachnoid and velvety beneath, margin tormentose, white; folds ample, porous, and gyrosodentate."

Another fungus which attacks oak-built vessels is the *Polyporus hybridus*, and is thus described by the same authority: "White, mycelium thick, forming a dense membrane or creeping branched strings, hymenium breaking into areæ, pores long, slender, minute." A well-preserved specimen of this fungus can be seen in the museum of the Department of Agriculture at Washington. Large fungus-growths have been known to grow in the holds of ships, giving rise to marked febrile movements in the greater part of the crews. The only works upon this interesting subject to which I have had access are those of Bowden, Knowles, Brittan, and Brewer.[1]

Now, this decay of organic matter under the influences of heat and moisture results, as has been stated, in the production of malaria; and it needs no suggestion to any physician of the results in malarial blood-poisoning.

To prevent the decay of wood used in ship-building, and thus remove a source of malarial poisoning on ship-board, demands alike the attention of the ship-builder and the sanitarian. The attempts to arrest the decay of ship-timber have a very ancient origin, and have been also very varied, the earliest noticed method being in the Ark; for we read that that vessel was "pitched within and without with pitch."

In historic times oil and tar are the earliest mentioned methods of preservation; later, the use of salt. A word just here as to salted ships, as they are or were called, from the packing of the intercostal spaces with salt, and which practice has left its imprint on the technology of a ship in the "salt heads." The practice of salting ships with common salt had its origin about the years 1768–73; but it was soon found that such practice caused the rapid corrosion of the iron bolts, and maintained an air between decks constantly saturated with aqueous vapor. Salt belongs to the deliquescents; and, whilst attracting and absorbing moisture from the air, renders a vessel constantly damp. It also renders wood after such exposure, and then allowed to become dry, brittle. It should never be used in ship-building as an antidote to dry rot. In the year 1796 Hales proposed the creasoting of wood as a preservative; in 1832 Kyan patented his process for the prevention of decay in wood by the use of corrosive sublimate; in 1838 Bethell perfected his patent for creasoting timber, and in about the same years (1838–40) Sir William Burnett received letters-patent for his process of preserving wood by the use of zinc chloride. The most successful of all these patents are those of Kyan, Bethell, and Burnett. Some personal observation of creasoted wood used as piles, leads me

[1] The principal fungi, other than those mentioned, causing the more or less rapid deterioration of wood, are the *Thetophora domestica*, *Xylostroma giganteum*, *Cerulius vastator*, *Auricularia pulverulenta*, *Boletus hybridus*, *B. medullæ panis*, *B. lachrymans*, *B. destructor*, and some species of *Helminthosporium*. Perhaps some of these names are but synonymes of the same fungus.

to think favorably of that process. I am not aware, however, of a vessel ever being built of creasoted timber. Since the last period named, patents for the preservation of timber are numerous. Some late methods for the conservation of wood deserve to be mentioned. The method of Lapparent (1862), by which wood is subjected to a hot gas-flame, so that it is charred on the surface to the depth of from one-quarter to one-third of a millimeter, whilst to a certain depth the albumen beneath this layer is coagulated. Jarry has proposed the impregnation of fabrics so as to render them water-proof by the use of aluminium soap (oleate and stearate) ; and Wagner, in 1862, suggested the use of this same soap, made by mixing aluminium acetate with a solution of ordinary soap, for the purpose of preserving wood from dampness, in fact water-proofing wood, or rendering it impervious to moisture. The latest method is the impregnation of wood by oils of the Terbene Series, raised to high temperatures. Time can only measure their success.

Dry rot in timber (which, as has been stated, derives its name from its effects rather than its cause) differs from wet rot in this, that dry rot takes place in dead wood ; wet rot may take place in both living and dead wood. Wood in damp situations deprived of air is liable to wet rot. The permanent arrest of decay in wood may be an impossibility in the order of nature ; but the limitation by chemical means of the baleful and disease-producing effects of such decay are within the province of the sanitarian, when he adds to such measures — dryness and fresh air. The cleanliness of the hold of the vessel should be also insisted upon by law. Previous to the reception of cargo or passengers at the port of departure, the hold and decks should be cleaned : the remnants of former cargoes and the vestiges of former diseases cling tenaciously to vessels. The hold should be lime-washed, — dried. One or two strakes from the keelson outwards should be removed for cleanliness, and the intercostal spaces should always be kept clean and free from dirt. I think that these strakes should be removable at all times, and not bolted permanently to the frame-timbers. It has been advised that vessels be built without permanent inner ceiling. Certainly it is within the capability of the naval constructor to build a vessel without such spaces between the timbers for the accumulation of decaying matter. Let the vessel be built solid. These remarks appertain, as will be observed, to wooden vessels. Of the conditions in iron vessels the exact information is too scant at present for a generalization.

In these vessels, however, although the hull is of iron, and in many cases the floors filled with cement, wood is principally used in their internal fittings, especially in the spaces to be inhabited. Iron hulls, being good conductors of heat, are said to be always of the temperature of the water in which they float.

The statement needs physical confirmation.

Bilge-Water.

This seems to have been just as much of a nuisance to the early voyager as it is to the present sea-traveller. In the earliest sea-ballads known, about the time of Henry VI., it is thus growled at : —

"For when that we shall go to bedde,
The pumpe was nygh our bedde's head.
A man were as good to be dede,
As smell thereof the stynk."

Bilge-water should be pumped out every watch, and a solution of ordinary sulphate of iron freely used daily in the bilges and limbers. Some experiments of my own upon the composition of bilge-water, which opportunity has not permitted me to confirm, lead me to state that it differs very decidedly in all its characteristics from the sea-water examined at the same time and in the same locality. It is of greater specific gravity, strongly alkaline, contains free ammonium and other alkaline sulphides, with some excess of the sulphates and chlorides. That there is also free ammonia and also albumenoid ammonia, is readily detected by Wanklyn's process. MacDonald of Netley has figured an anguillula, and I have in my possession the photo-micrograph of a spirillum found in bilge-water by my friend Dr. George M. Sternberg, U.S.A. Now, according to Pasteur, the varieties of spirillum are classed amongst the most active agents of putrid fermentation: their presence, therefore, in bilge-water, may be considered evidence that it is the vehicle for substances which undergo such fermentations, and bilge-water must be placed in the list of putrescent fluids.

There is here an opportunity for an extended physical, chemical, and microscopic investigation; and especially is this desirable in regard to the temperatures of bilge-water and surrounding sea-water, when uninfluenced by other causes, as may be readily conceived of as existing in steamships when cruising within the tropics.

The warming of the passenger compartments of a vessel during an autumn or winter's voyage, or at any time, is readily secured by the introduction of steam-heating coils on the decks so occupied, and supplied with steam from the boilers.

A word here concerning disinfectants. The British Merchant Shipping Act directs that chloralum be used whenever a disinfectant becomes necessary. Chloride of lime, as suggested in the statute, is efficient only from the chlorine evolved, and is, from that fact, apt to prove troublesome to the lungs of the passengers: besides, sprinkled on the decks, it increases the humidity.

The writer, from chemical reasons alone, prefers the use of the impure chlorides of zinc or iron as a disinfectant in the bilges.

Chloride of lime is, however, a useful addition in small quantities to the ordinary whitewash with which the sides and ceilings of passenger decks should be covered. As to the use of sulphurous acid, produced by burning sulphur in these apartments, the writer is of the opinion that the quantity of sulphur to be used for such purposes should be measured by the permanent acidity produced in the strongly alkaline bilge-water, after exposure for a time to the gas thus generated.

Baxter of London found that bacteria were destroyed in solutions rendered permanently acid by this gas. If the bilge-water has been removed, it is

suggested that a standard alkaline solution of either potassa or soda be made as the measure of the extent of the disinfection; the alkalinity of the solution being determined before and after exposure during a given time for the absorption of the gas, and its neutralizing the alkali, then titrated, and the alkalinity expressed in terms of normal solution of sulphuric acid required to saturate.

However, it is to cleanliness, dryness, ventilation, proper food, and the use of pure drinking-water, that the sanitary officer of every vessel should look for safety from nuisances and infection. Artificial disinfection cannot properly supply the place of the three essentials, — cleanliness, dryness, and ventilation.

SECTION IX.

The proposed statute also provides for the mustering of the passengers and the airing of bedding whenever the weather permits, and grants the use of sufficient space on the spar-deck for exercise. It is also provided that neither officers nor crew shall visit the apartments provided for the passengers, except by direction or permission of the master of the vessel, and then only for the purpose of performing some act of duty.

This part of the statute is meant for the protection of female emigrants, and needs no comment save unqualified indorsement.

It is also provided that nitro-glycerine, dynamite, or any other explosive material, nor vitriol or like acids, or gunpowder, save for ship's use, are to be carried, nor articles as cargo or ballast, which, by reason of the nature or quantity or mode of storage, are likely to endanger the lives or health of the passenger. Horses or cattle, or other animals, are not to be carried on decks below those on which passengers are berthed, nor in their apartments, nor in adjoining compartments. Animals may be carried, however, in iron vessels with water-tight bulkheads extending to the upper deck. These are wise provisions in the proposed law. Vessels laden with guano, poudrette, green hides, ballasted with street-sweepings, decaying porous rock, or coal-screenings, etc., are more or less dangerous to the health of the passengers and crew, as well as to the ports to which destined. A correct list, in duplicate, verified under the oath of the master, of all passengers, giving name, age, sex, nativity, and occupation, with the amount of baggage, intended destination or location, compartment occupied during the voyage, together with a record of the name, age, sex, and cause of death, in the event of such occurrence during the voyage, must be delivered to the collector of customs at the port of entry. In the event of the death from natural causes of every passenger over eight years of age, the master or consignee shall pay to the collector of customs, within twenty-four hours after entry, the sum of ten dollars. It would be well to have inserted a clause, that, in the event of the appearance of any contagious or infectious disease on board, notice of such occurrence should be made public at once, upon the arrival of the vessel at the port of destination, by competent authority, under a penalty for non-compliance with such a statute. It has come within my cognizance this year, that emigrants arriving at a

port on a vessel with small-pox on board have carried the disease to our inland cities, travelling over a thousand miles in railroad-cars during the period of incubation.

It is directed that an inspector or customs officer shall examine the vessel, and measure the compartments occupied by emigrants, the measurements to be as prescribed for determining the tonnage (see Appendix X.) ; and the number of passengers on the list furnished the collector is to be compared with these measurements. The inspector is to make to the collector or surveyor of the port a report, in which is to be stated the port of departure ; the time of sailing ; the length of the voyage ; the ventilation ; the number of passengers and their nativity ; the cubic space in compartments, with the number of berths and passengers in each space ; the kind and quantity of food furnished ; the age, sex, and disease, if any have died ; and, in case of any unusual sickness or mortality during the voyage, to report whether the same was caused by any neglect or violation of the provisions of the Act, or by want of proper care against disease by the master or owner ; and these reports are to be forwarded to the Secretary of the Treasury.[1] The provisions of the Act to apply to vessels leaving the United States for foreign ports, or ports on the Pacific. The various penalties imposed to be liens upon the vessel.[2]

The terms of this provision in the statute leave much to be desired. The inspection report should also contain condition of cooking apparatus ; quantity and quality of water-supply ; extent, location, and condition of hospitals ; location and condition of the water-closets ; the condition of the hold as to cleanliness ; the presence of decaying wood ; and the number of passengers in excess of the law, as well as the number of sick, on arrival and on the voyage, with their diseases.

This inspection should be made previous to sailing, at the port of departure, as well as at the end of the voyage, at the final port of entry. Bell says, "The only means for the prevention of disease on ships are a searching inspection, and consequent cleansing and disinfection, of all vessels at the port of departure, at all ports, at all seasons, before being allowed to take cargo or passengers on board. Of the absolute necessity for a thorough sanitary inspection and cleansing of vessels, there can be no question either from a commercial or sanitary stand-point. That a foul ship is a carrier of disease, is a sanitary axiom. All sanitarians are aware of the facts that cholera, small-pox, diphtheria, relapsing, typhus, and yellow fever have again and again been carried by filthy passenger vessels. The evidence almost amounts to a demonstration, that typhus (ship-fever, an ochletic disease) can originate *de novo* in an overcrowded passenger vessel ; and there is a daily increasing belief that yellow

[1] The form of report of such examination in use at the port of New York is appended. (See Appendix XI.)

[2] The consular regulations of the Department of State (1874) make it the duty of all consular officers to report to the department all violations by masters of vessels bound to any port of the United States, or any territory thereof, of the statute regulating the transportation of emigrants between Europe and the United States.

fever is a disease of ship origin. The establishment and maintenance, as well as support, of costly and expensive quarantines, rest solely upon filthy ships, — the carriers of pests. It is difficult, if not impossible, to disassociate from quarantine the idea of a foul ship. As to a sanitary inspection of the passengers, Woodworth has placed the correct estimate upon such examination in these words: 'To wait until the potential or active germs of disease in the poorly fed, badly lodged, etiolated, anoxemiated, and generally demoralized emigrants actually arrive within the jurisdiction of the port, before enforcing preventive and preservative measures, is hardly the highest sanitary wisdom.' To secure all that is required seems so plain, so evident, so easy and practical, the advantages so great, — and, if measured by commercial rather than sanitary standards, so valuable to the community, — that one stands in wonder, and questions the civilization of the century that fails to recognize the benefits to be obtained by the sanitary inspection of vessels, their cargoes, passengers, and crews." A bill of health from the port of departure, such as that directed by law in accordance with the Act of June 2, 1879, should accompany each vessel. (See Appendix XII.)

Such bill of health, truthfully made out, is an official guide to the health officer of the port to which the vessel is destined. It does not for an instant relieve that officer from the responsibility which rests upon him of guarding the lives of his community from loathsome infection or contagion; but it gives him the facts upon which an intelligent opinion could be based in an event calling for his judgment upon the sanitary condition of the vessel, her cargo, passengers, and crew. I have remarked that these bills should be made out truthfully; for it is within my experience to know that clean bills of health have been given to foul ships. The usual addition to a bill of health, that the vessel clears in "free *pratique*," is of no consequence at the present time. The sanitary history of the vessel, cargo, passengers, and crew, with the prevailing diseases of the port of departure when the vessel leaves, are all the facts necessary to be recorded upon such a document.

Vexatious detentions to passengers and cargoes occur because the antecedent sanitary history of a vessel is unknown at quarantine stations. Both in a sanitary and commercial point of view, it is cheaper to have a clean vessel than a foul one. Dr. S. O. Vanderpool has stated that the few clean vessels from Havana to New York never became infected with yellow fever, some even after twenty years' service. The expenses incident to quarantine were thus saved to their owners.

It is suggested, that for every passenger over and above the number permitted to be carried by law, according to the cubic air-space of the passenger-carrying decks in the vessel, the owners shall forfeit to the commissioners of emigration of New York, or like boards or authorities at the port of entry, for the use and behoof of the duties imposed upon such authorities, the sum of one hundred dollars for each and every passenger above the complement allowed by law, such sum to be recovered in courts having jurisdiction, and that the same be a lien upon the vessel.

It may not be out of place here to notice the report of the Board of Commissioners of Emigration at New York for 1879. This board was called into existence in 1847 "for the care and protection of immigrant passengers;" and the present administration was organized in 1873. It had its origin in the desire to arrest the abuses, wrongs, and careless indifference which the emigrant met from the moment his footsteps turned westward.

Their report for 1879 is an exhibit of the humane work in which they are engaged; the simple story of a great good, managed quietly, and told unostentatiously.

The writer respectfully submits the following suggestive outline of a code, with a daily routine, which he considers will do much toward reducing to order the chaos that prevails in a crowded emigrant vessel: —

The emigrant to be inspected at the port of departure as to his physical cleanness and freedom from disease; the blind, insane, idiotic, infirm, and sick returned to the shore, as well as the maimed and lame, unless under restrictions that they will not become burdens to the community to which they are destined: the like inspection to take place upon landing at our own ports, and the above-mentioned persons returned to the ship.

The Hon. S. S. Cox, in the House of Representatives Dec. 2, 1879, has elaborated this matter in his bill to regulate emigration.

There should be to every one hundred male passengers a steerage steward, and to every fifty female passengers with children a steerage stewardess, whose duties should be to supervise the passengers and their apartments, and see that both are kept clean.

As soon after departure as possible, the emigrants should be grouped into messes of twenty, one of the twenty to act as mess-man under the direction of the steerage steward. The duty of the mess-man should be to look after the cleanliness of the mess-gear, the tables, pots, pans, etc.; to receive the cooked food from the galley, or camboose; and to see the meals served.

The cooked food should be inspected before serving out by the officer of the watch, to see that it is properly cooked.

Call all passengers at 5.30 A.M., except women and children; serve out coffee and biscuit; and have the men bathe themselves on the spar-deck, weather permitting, and clear up the decks afterwards.

At 6.30 A.M., up all bedding, if the weather is favorable. Call the women and children, and have them wash and dress themselves. At 7 A.M., call all hands to breakfast. At 8 A.M., clean up, sweep down, cleanse berths; keep all hands on deck, except the sick and working-gangs. 9 A.M., serve out provisions. 10 A.M., mess-men to report to steerage stewards their decks, mess-gear, berths, etc., ready for inspection. At 10.30 A.M., an inspection to be made by the captain and medical officer. At 11 A.M., after inspection, spread mess-gear for dinner. 12 M., dinner. 1.30 P.M., clean up, sweep down, put away mess-gear. 2.30 P.M., down all bedding and make up berths. 4 P.M., prepare for supper. 5 P.M., supper. 6.30, P.M., clean up, sweep down, put away mess-gear. 8 P.M., pipe down, turn in, out all fires and lights, except

those in charge of the watch. No naked lights to be allowed, nor smoking between decks, nor friction matches of any kind whatever to be carried by emigrants.

On Saturdays let the emigrant wash his clothes, the clothes-lines to be rove on Friday evenings.

Some such method as this specified can be made, and a captain who cannot arrange some such routine is incompetent to take charge of a passenger vessel. The writer would have steamship companies mulct heavily for carrying passengers in excess of the law; or, failing to secure immunity from overcrowding by expensive suits at law, prohibit the landing of any passengers carried in excess of the limits established by our own statutes.

Steamship companies, under such a ruling, would soon cease this murderous custom.

There is a necessity for an *actual* inspection of the food-supply; of the water; of the apartments; of a complete and thorough sanitary inspection of the vessel at the port of departure and before the reception on board of the emigrant. Indeed, the sanitary care of a vessel should commence with the laying of her keel, removing, as the vessel progresses in building, all the *débris* that collects during the construction, — to see that all the permanently enclosed spaces, especially those between the ribs, are free from dirt, chips, sawdust, and all other kinds of refuse. Such sanitary care should never cease.

Although most of the emigrants to our shores are carried in vessels under foreign flags, and not directly amenable to our laws, yet it is within the province of the government, if not its duty, to provide for the health of its citizens; and, as these emigrants become the future citizens, it certainly has the right to demand that they shall be protected by legislation in life and health in their transit of the ocean to their homes in the New World.

The statement that the average emigrant is marked by a low degree in the social scale, which has been put forth as an excuse for much of the degradation heaped upon him in his transatlantic voyage, may be accepted as true; but the writer fails to see in such statement any warrant for such unsanitary surroundings about them as would disgrace a pig-sty. In the reports furnished Congress upon this subject, it is instructive to observe the uniform adherence to the laws of his fatherland or mother country concerning emigration which characterizes the English, German, and other writers. Viewing this matter commercially, each indorses the law of his native land as leaving nothing to be desired; each cites the great care taken of the emigrant at the port of departure, eulogizes the rigid scrutiny of the food-supply, the water allowance, the cooking, the air-space, the seaworthiness of the vessel, crew, etc.; each strenuously insisting that this inspection is made to see that the laws are complied with: and then, for comparison, to place the results of official inspection at the port of entry, where the emigrant is delivered to us, — the decaying, ill-cooked, and scanty allowance of food, insufficient and bad water-supply, careless indifference to the sick, gross insults to unprotected women, the overcrowding, dampness, bestial filthiness of the compartments, etc., exist-

ing in all alike. That this pen-picture is but faintly limned, I know; but I can refer, for evidence of every statement made, to the returns to the House of Commons, 1876, concerning the health of crews of merchant vessels in the British mercantile marine, and to the appended extracts from papers, which can be multiplied indefinitely. (Appendix XIII.)

And yet these owners of large steamship lines, boasting of their superior accommodations and discipline, admitting the demonstrated facts of increased disease and death-rates, of the disease-producing effects of overcrowding, of all the violations of the law, etc., in their vessels, recognizing at the same time the preventive measures proposed by the sanitarian as efficient safeguards to the health of this mass of the population, with a sublimity than to which impudence can rise no higher, suggest a rise in the rates of fare for the emigrant in their floating stock-yards.

The execution of the existing statutes for the protection of the emigrant is a sorry travesty upon even a feeble enforcement: the laws stand on the statute-book ignored; and, so long as they remain so, will they be bright and shining examples of ponderous wordiness, —

"Full of sound and fury, signifying nothing."

The remedy for all this is in the hands of the legislator. Enforce the law, or make a law that can be enforced. Prevent all landing on our shores of emigrants, rather than subject them to the present degradations of the steerage permitted by laws now in existence, which are no more regarded than the bleating of a sheep.

I have thus far presented cursorily to consideration from a sanitary standpoint all the actual and the proposed legislation concerning the emigrant up to the present time. The proposed bill is an improvement upon previous legislation; but, to be effective, it must keep up with the advance of sanitary science. It is not abreast the requirements demanded by modern scientific sanitary research. In asking for this recognition of improved sanitary surroundings for the emigrant, there has been demanded nothing more than that which can be sustained by appeal to physiological, chemical, and sanitary laws.

The writer has also taken into careful consideration the emigration laws of other countries, in connection with our present and proposed legislation.

These laws differ materially, and in varying degrees from our own; and he is of the opinion that the regulation of the whole matter comes within the jurisdiction of the country of which the emigrant proposes to become a permanent inhabitant. The right of expatriation is recognized by our statutes; and the first "casting loose" from a foreign dock of the vessel in which the emigrant takes passage for the land of his adoption, renders such expatriation an accomplished fact. The differences, however, in these laws can only be settled by an international conference with those nations most interested; but, as stated in the outset, these questions must be left to the discussion of the lawmakers.

In concluding this sketch of the hygiene of emigrant vessels, it may be considered that the writer advocates measures that cannot be accomplished on ship-board; that the securing of such sanitary surroundings are not feasible, and impracticable, besides being far beyond the requisites and expectations of the emigrant. Such an argument has been put forth more than once in the discussion of these matters. There is nothing at all impracticable in cleanliness, dryness, and ventilation, as opposed to filth, dampness, and foul air. There is no argument for overcrowding at the price paid for lives, save

"The accursed greed of gain."

The condition of the emigrant vessels arriving on our shores would be a disgrace to barbarism: how much more so are they to our sham enlightenment? In the struggle for existence we all know that sooner or later the weak "goes to the wall" according to the degree of his weakness; but go he must in obedience to the action of inexorable law.

No other consideration but the regard he has for the profession to which he belongs makes the writer demand for the weak and strong alike all that Nature so lavishly bestows, and he specializes this demand for the sailor and emigrant.

"The slayer Death is everywhere, and many a mask hath he;
Many and awful are the shapes in which he rules the sea."

Enveloped at sea in the cleanest and purest air on deck, they should LIVE in the healthiest habitation below.

APPENDICES.

APPENDIX I.

An Act regulating Passenger Ships and Vessels.

Be it enacted, etc., That if the master or other person on board of any ship or vessel owned in the whole or in part by a citizen or citizens of the United States, or the territories thereof, or by a subject or subjects, citizen or citizens, of any foreign country, shall, after the first day of January next, take on board of such ship or vessel at any foreign port or place, or shall bring or convey into the United States, or the territories thereof, from any foreign port or place, or shall carry, convey, or transport from the United States, or the territories thereof, to any foreign port or place, a greater number of passengers than two for every five tons of such ship or vessel, according to custom-house measurement, every such master or other person so offending, and the owner or owners of such ship or vessel, shall severally forfeit and pay to the United States the sum of one hundred and fifty dollars for each and every passenger so taken on board of such ship or vessel over and above the aforesaid number of two to every five tons of such ship or vessel, to be recovered by suit in any circuit or district court of the United States where the said vessel may arrive, or where the owner or owners aforesaid may reside: *provided*, nevertheless, that nothing in this Act shall be taken to apply to the complement of men usually and ordinarily employed in navigating such ship or vessel.

Sect. 2. *And be it further enacted*, That if the number of passengers be so taken on board of any ship or vessel as aforesaid, or conveyed or brought into the United States or transported therefrom as aforesaid, shall exceed the said proportion of two to every five tons of such ship or vessel by the number of twenty passengers in the whole, every such ship or vessel shall be deemed and taken to be forfeited to the United States, and shall be prosecuted and distributed in the same manner in which the forfeitures and penalties are recovered and distributed under the provisions of the Act entitled "An Act to regulate the collection of duties on imports and tonnage."

Sect. 3. *And be it further enacted*, That every ship or vessel bound on a voyage from the United States to any port on the continent of Europe, at the time of leaving the last port whence such ship or vessel shall sail, shall have on board, well secured under deck, at least sixty gallons of water, one hundred pounds of salted provisions, one gallon of vinegar, and one hundred pounds of wholesome ship-bread for each and every passenger on board such ship or vessel, over and above such other provisions, stores, and live-stock as may be put on board by such master or passenger for their use, or that of the crew of such ship or vessel, and in like proportion for a shorter or longer voyage; and if the passengers on board of such ship or vessel in which the proportions of provisions herein directed shall not have been provided shall at any time be put on short

allowance, in water, flesh, vinegar, or bread, during any voyage aforesaid, the master or owner of such ship or vessel shall severally pay to each and every passenger who shall have been put on short allowance as aforesaid, the sum of three dollars for each and every day they may have been on such short allowance, to be recovered in the same manner as seamen's wages are or may be recovered.

SECT. 4. *And be it further enacted*, That the captain or master of any ship or vessel arriving in the United States, or any of the territories thereof, from any foreign place whatever, at the same time that he delivers a manifest of cargo, and, if there be no cargo, then at the time of making report or entry of the ship or vessel, pursuant to the existing laws of the United States, shall also deliver and report, to the collector of the district in which such ship or vessel shall arrive, a list or manifest of all the passengers taken on board of the ship or vessel at any foreign port or place; in which list or manifest it shall be the duty of the said master to designate particularly the age, sex, and occupation of said passengers respectively, the country to which they severally belong, and that of which it is their intention to become inhabitants; and shall further set forth whether any and what number have died on the voyage: which report and manifest shall be sworn to by said master in the same manner as is directed by the existing laws of the United States in relation to the manifest of cargo, and that the refusal or neglect of the master aforesaid to comply with the provisions of this section shall incur the same penalties, disabilities, and forfeitures as are at present provided for a refusal or neglect to report and deliver a manifest of the cargo aforesaid.

SECT. 5. *And be it further enacted*, That each and every collector of the customs, to whom such manifest or list of passengers as aforesaid shall be delivered, shall, quarter-yearly, return copies thereof to the Secretary of State of the United States, by whom statements of the same shall be laid before Congress at each and every session. [*Approved March 2, 1819.*

APPENDIX II.

AN ACT TO REGULATE THE CARRIAGE OF PASSENGERS IN MERCHANT VESSELS.

Be it enacted, etc., That if the master of any vessel, owned in whole or in part by a citizen of the United States of America, or by a citizen of any foreign country, shall take on board such vessel, at any foreign port or place, a greater number of passengers than in the following proportion to the space occupied by them and appropriated for their use, and unoccupied by stores or other goods, not being the personal luggage of such passengers, that is to say, on the lower deck or platform one passenger for every fourteen clear superficial feet of deck, if such vessel is not to pass within the tropics during such voyage; but, if such vessel is to pass within the tropics during such voyage, then one passenger for every twenty such clear superficial feet of deck, and on the orlop deck (if any) one passenger for every thirty such superficial feet in all cases, with intent to bring such passengers to the United States of America, and shall leave such port or place with the same, and bring the same, or any number thereof, within the jurisdiction of the United States aforesaid; or if any such master of a vessel shall take on board of his vessel at any port or place within the jurisdiction of the United States aforesaid any greater number of passengers than the proportions aforesaid admit, with intent to carry the same to any foreign port or place, every such master shall be deemed guilty of a misdemeanor, and, upon conviction thereof before any circuit or district

court of the United States aforesaid, shall, for each passenger taken on board beyond the above proportions, be fined in the sum of fifty dollars, and may also be imprisoned for any term not exceeding one year: *provided*, that this Act shall not be construed to permit any ship or vessel to carry more than two passengers to five tons of such ship or vessel.

SECT. 2. *And be it further enacted*, That if the passengers so taken on board of such vessel, and brought into or transported from the United States aforesaid, shall exceed the number limited by the last section to the number of twenty in the whole, such vessel shall be forfeited to the United States aforesaid, and be prosecuted and distributed as forfeitures are, under the Act to regulate duties on imports and tonnage.

SECT. 3. *And be it further enacted*, That if any such vessel as aforesaid shall have more than two tiers of berths, or in case in such vessel the interval between the floor and the deck or platform beneath shall not be at least six inches, and the berths well constructed, or in case the dimensions of such berths shall not be at least six feet in length and at least eighteen inches in width, for each passenger as aforesaid, then the master of said vessel and the owners thereof, severally, shall forfeit and pay the sum of five dollars for each and every passenger on board of said vessel on such voyage, to be recovered by the United States as aforesaid in any circuit or district court of the United States where such vessel may arrive, or from which she sails.

SECT. 4. *And be it further enacted*, That, for the purposes of this Act, it shall in all cases be computed that two children, each being under the age of eight years, shall be equal to one passenger, and that children under the age of one year shall not be included in the computation of the number of passengers.

SECT. 5. *And be it further enacted*, That the amount of the several penalties imposed by this Act shall be liens on the vessel or vessels violating its provisions; and such vessel may be libelled and sold therefor in the district court of the United States aforesaid in which such vessel shall arrive. [*Approved Feb. 22, 1847.*

APPENDIX III.

AN ACT TO AMEND AN ACT ENTITLED "AN ACT TO REGULATE THE CARRIAGE OF PASSENGERS IN MERCHANT VESSELS," AND TO DETERMINE THE TIME WHEN SAID ACT SHALL TAKE EFFECT.

Be it enacted, etc., That the Act to regulate the carriage of passengers in merchant vessels, approved the twenty-second day of February, eighteen hundred and forty-seven, shall, in regard to all vessels arriving from ports on this side of the capes of Good Hope and Horn, take effect and be in force from and after the thirty-first day of May next ensuing, and, in regard to all vessels arriving from places beyond said capes, on and after the thirtieth day of October next ensuing.

SECT. 2. *And be it further enacted*, That so much of said Act as authorizes shippers to estimate two children of eight years of age and under as one passenger, in the assignment of room, is hereby repealed. [*Approved March 2, 1847.*

APPENDIX IV.

AN ACT TO PROVIDE FOR THE VENTILATION OF PASSENGER VESSELS, AND FOR OTHER PURPOSES.

Be it enacted, etc., That all vessels, whether of the United States or any other country, having sufficient capacity, according to law, for fifty or more passengers (other than cabin passengers), shall, when employed in transporting such passengers between the United States and Europe, have on the upper deck, for the use of such passengers, a house over the passage-way leading to the apartment allotted to such passengers below deck, firmly secured to the deck or coamings of the hatch, with two doors, the sills of which shall be at least one foot above the deck, so constructed that one door or window in such house may at all times be left open for ventilation; and all vessels so employed, and having the capacity to carry one hundred and fifty such passengers, or more, shall have two such houses, and the stairs or ladder leading down to the aforesaid apartment shall be furnished with a hand-rail of wood or strong rope: *provided*, nevertheless, booby-hatches may be substituted for such houses in vessels having three permanent decks.

SECT. 2. *And be it further enacted*, That every such vessel so employed, and having the legal capacity for more than one hundred such passengers, shall have at least two ventilators to purify the apartment or apartments occupied by such passengers, one of which shall be inserted in the after part of the apartment or apartments, and the other shall be placed in the forward portion of the apartment or apartments; and one of them shall have an exhausting-cap to carry off the foul air, and the other a receiving-cap to carry down the fresh air; which said ventilators shall have a capacity proportioned to the size of the apartment or apartments to be purified; namely, if the apartment or apartments will lawfully authorize the reception of two hundred such passengers, the capacity of such ventilators shall, each of them, be equal to a tube of twelve inches diameter in the clear, and in proportion for larger or smaller apartments; and all said ventilators shall rise at least four feet and six inches above the upper deck of any such vessel, and be of the most approved form and construction: *provided*, that if it shall appear, from the report to be made and approved, as provided in the seventh section of this Act, that such vessel is equally well ventilated by any other means, such other means of ventilation shall be deemed, and held to be, a compliance with the provisions of this section.

SECT. 3. *And be it further enacted*, That every vessel carrying more than fifty such passengers shall have for their use on deck, housed and conveniently arranged, at least one camboose or cooking-range, the dimensions of which shall be equal to four feet long and one foot six inches wide for every two hundred passengers; and provision shall be made in the manner aforesaid in this ratio for a greater or less number of passengers: *provided*, however, and nothing herein contained shall take away the right to make such arrangements for cooking between decks, if that shall be deemed desirable.

SECT. 4. *And be it further enacted*, That all vessels employed as aforesaid shall have on board, for the use of such passengers, at the time of leaving the last port whence such vessel shall sail, well secured under deck, for each passenger, at least fifteen pounds of good navy bread, ten pounds of rice, ten pounds of oatmeal, ten pounds of wheat-flour, ten pounds of peas and beans, thirty-five pounds

of potatoes, one pint of vinegar, sixty gallons of fresh water, ten pounds of salted pork, free of bone, all to be of good quality, and a sufficient supply of fuel for cooking; but at places where either rice, oatmeal, wheat-flour, or peas and beans cannot be procured of good quality and on reasonable terms, the quantity of either or any of the other last-named articles may be increased and substituted therefor; and, in case potatoes cannot be procured on reasonable terms, one pound of either of said articles may be substituted in lieu of five pounds of potatoes: and the captains of such vessels shall deliver to each passenger at least one-tenth part of the aforesaid provisions weekly, commencing on the day of sailing, and daily at least three quarts of water, and sufficient fuel for cooking; and if the passengers on board of any such vessel in which the provisions, fuel, and water herein required shall not have been provided as aforesaid, shall at any time be put on short allowance during any voyage, the master or owner of any such vessels shall pay to each and every passenger who shall have been put on short allowance the sum of three dollars for each and every day they may have been on such short allowance, to be recovered in the circuit or district court of the United States: *provided*, nevertheless, and nothing herein contained shall prevent any passenger, with the consent of the captain, from furnishing for himself the articles of food herein specified; and, if put on board in good order, it shall fully satisfy the provisions of this Act so far as regards food: *and provided further*, that any passenger may also, with the consent of the captain, furnish an equivalent for the articles of food required, in other and different articles; and if, without waste or neglect on the part of the passenger, or inevitable accident, they prove insufficient, and the captain shall furnish comfortable food to such passengers during the residue of the voyage, this in regard to food shall also be a compliance with the terms of this Act.

SECT. 5. *And be it further enacted*, That the captain of any such vessel so employed is hereby authorized to maintain good discipline and such habits of cleanliness among such passengers as will tend to the preservation and promotion of health; and to that end, he shall cause such regulations as he may adopt for this purpose to be posted up before sailing, on board such vessel, in a place accessible to such passengers, and shall keep the same so posted up during the voyage: and it is hereby made the duty of said captain to cause the apartment occupied by such passengers to be kept at all times in a clean, healthy state; and the owners of every such vessel so employed are required to construct the decks, and all parts of said apartment, so that it can be thoroughly cleansed; and they shall also provide a safe, convenient privy or water-closet for the exclusive use of every one hundred such passengers. And when the weather is such that said passengers cannot be mustered on deck with their bedding, it shall be the duty of the captain of every such vessel to cause the deck occupied by such passengers to be cleaned with chloride of lime, or some other equally efficient disinfecting agent, and also at such other times as said captain may deem necessary.

SECT. 6. *And be it further enacted*, That the master and owner or owners of any such vessel so employed, which shall not be provided with the house or houses over the passage-ways, as prescribed in the first section of this Act; or with the ventilators, as prescribed in the second section of this Act; or with the cambooses or cooking-ranges, with the houses over them, as prescribed in the third section of this Act; shall severally forfeit and pay to the United States the sum of two hundred dollars for each and every violation of or neglect to conform to the provisions of each of said sections, and fifty dollars for each and every neglect or

violation of any of the provisions of the fifth section of this Act; to be recovered by suit in any circuit or district court of the United States, within the jurisdiction of which the said vessel may arrive, or from which it may be about to depart, or at any place within the jurisdiction of such courts, wherever the owner or owners or captain of such vessel may be found.

SECT. 7. *And be it further enacted*, That the collector of the customs at any port in the United States at which any vessel so employed shall arrive, or from which any such vessel shall be about to depart, shall appoint and direct one of the inspectors of the customs for such port to examine such vessel, and to report in writing to such collector, whether the provisions of the first, second, third, and fifth sections of this Act have been complied with in respect to such vessel; and if such report shall state such compliance and be approved by such collector, it shall be deemed and held as conclusive evidence thereof.

SECT. 8. *And be it further enacted*, That the first section of the Act entitled "An Act to regulate the carriage of passengers in merchant vessels," approved February twenty-two, eighteen hundred and forty-seven, be so amended that when the height or distance between the decks of the vessels referred to in the said section shall be less than six feet, and not less than five feet, there shall be allowed to each passenger sixteen clear superficial feet on the deck, instead of fourteen, as prescribed in said section; and if the height or distance between the decks shall be less than five feet, there shall be allowed to each passenger twenty-two clear superficial feet on the deck; and if the master of any such vessel shall take on board his vessel, in any port of the United States, a greater number of passengers than is allowed by this section, with the intent specified in said first section of the Act of eighteen hundred and forty-seven, or if the master of any such vessel shall take on board at a foreign port, and bring within the jurisdiction of the United States, a greater number of passengers than is allowed by this section, said master shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished in the manner provided for the punishment of persons convicted of a violation of the Act aforesaid; and in computing the number of passengers on board such vessels, all children under the age of one year at the time of embarkation shall be excluded from such computation.

SECT. 9. *And be it further enacted*, That this Act shall take effect in respect to such vessels sailing from ports in the United States in thirty days from the time of its approval; and, in respect to every such vessel sailing from ports in Europe, in sixty days after such approval; and it is hereby made the duty of the Secretary of State to give notice in the ports of Europe of this Act in such manner as he may deem proper.

SECT. 10. *And be it further enacted*, That so much of the first section of the Act entitled "An Act regulating passenger ships and vessels," approved March two, eighteen hundred and nineteen, or any other Act that limits the number of passengers to two for every five tons, is hereby repealed. [*Approved May 17, 1848.*

APPENDIX V.

AN ACT TO EXTEND THE PROVISIONS OF ALL LAWS NOW IN FORCE RELATING TO THE CARRIAGE OF PASSENGERS IN MERCHANT VESSELS, AND THE REGULATION THEREOF.

Be it enacted, etc., That all vessels bound from any port in the United States to any port or place in the Pacific Ocean, or on its tributaries, or from any such port

or place to any port or place in the United States on the Atlantic, or its tributaries, shall be subject to the provisions of all the laws now in force relating to the carriage of passengers in merchant vessels sailing to and from foreign countries, and the regulation thereof; except the fourth section of the "Act to provide for the ventilation of passenger vessels, and for other purposes," approved May seventeen, eighteen hundred and forty-eight, relating to provisions, water, and fuel; but owners and masters of all such vessels shall, in all cases, furnish to each passenger the daily supply of water therein mentioned, and they shall furnish, or cause the passengers to furnish for themselves, a sufficient supply of good and wholesome food; and in case they shall fail so to do, or shall provide unwholesome or unsuitable provisions, they shall be subject to the penalty provided in said fourth section, in case the passengers are put on short allowance of water or provisions.

SECT. 2. *And be it further enacted*, That the Act entitled "An Act to regulate the carriage of passengers in merchant vessels," approved February twenty-two, eighteen hundred and forty-seven, shall be so amended as that a vessel passing into or through the tropics shall be allowed to carry the same number of passengers as vessels that do not enter the tropics.

SECT. 3. *And be it further enacted*, That this Act shall take effect on and after the fifteenth day of March, eighteen hundred and forty-nine. [*Approved March 3, 1849.*

APPENDIX VI.

AN ACT TO REGULATE THE CARRIAGE OF PASSENGERS IN STEAMSHIPS AND OTHER VESSELS.

Be it enacted, etc., That no master of any vessel owned in whole or in part by a citizen of the United States, or by a citizen of any foreign country, shall take on board such vessel, at any foreign port or place, other than foreign contiguous territory of the United States, a greater number of passengers than in the proportion of one to every two tons of such vessel, not including children under the age of one year in the computation, and computing two children over one and under eight years of age as one passenger. That the spaces appropriated for the use of such passengers, and which shall not be occupied by stores or other goods, nor the personal baggage of such passengers, shall be in the following proportions: viz., on the main and poop decks or platforms, and in the deck-houses, if there be any, one passenger for each sixteen clear superficial feet of deck, if the height or distance between the decks or platform shall not be less than six feet; and on the lower deck (not being any orlop deck), if any, one passenger for eighteen such clear superficial feet, if the height or distance between the decks or platforms shall not be less than six feet; but so as that no passenger shall be carried on any other deck or platform, nor upon any deck where the height or distance between decks is less than six feet, with intent to bring such passenger to the United States, and shall leave such port or place and bring the same, or any number thereof, within the jurisdiction of the United States; or if any such master of any vessel shall take on board his vessel, at any port or place within the jurisdiction of the United States, any greater number of passengers than in the proportion aforesaid, to the space aforesaid, or to the tonnage aforesaid, with intent to carry the same to any foreign port or place other than foreign contiguous territory as aforesaid, every such master shall be deemed guilty of a mis-

demeanor, and, upon conviction thereof, before any circuit or district court of the United States, shall, for each passenger taken on board beyond the limit aforesaid, or the space aforesaid, be fined in the sum of fifty dollars, and may also be imprisoned, at the discretion of the judge before whom the penalty shall be recovered, not exceeding six months; but should it be necessary, for the safety or convenience of the vessel, that any portion of her cargo, or any other articles or article, should be placed on or stored in any of the decks, cabins, or other places appropriated to the use of passengers, the same may be placed in lockers or enclosures prepared for the purpose on an exterior surface impervious to the wave, capable of being cleansed in like manner as the decks or platforms of the vessel. In no case, however, shall the places thus provided be deemed to be a part of the space allowable for the use of passengers, but the same shall be deducted therefrom; and in all cases where prepared or used, the upper surface of said lockers or enclosed spaces shall be deemed and taken to be the deck or platform from which measurement shall be made for all the purposes of this Act. It is also provided, that one hospital in the spaces appropriated to passengers, and separate therefrom by an appropriate partition, and furnished as its purposes require, may be prepared, and, when used, may be included in the space allowable for passengers; but the same shall not occupy more than one hundred superficial feet of deck or platform: *provided*, that on board two-deck ships, where the height between the decks is seven and one-half feet or more, fourteen clear superficial feet of deck shall be the proportion required for each passenger.

SECT. 2. *And be it further enacted*, That no such vessel shall have more than two tiers of berths, and the interval between the lowest part thereof, and the deck or platform beneath, shall not be less than nine inches; and the berths shall be well constructed, parallel with the sides of the vessel, and separated from each other by partitions, as berths ordinarily are separated, and shall be at least six feet in length, and at least two feet in width, and each berth shall be occupied by no more than one passenger; but double berths of twice the above width may be constructed, each berth to be occupied by no more, and by no other, than two women, or by one woman and two children under the age of eight years, or by husband and wife, or by a man and two of his own children under the age of eight years, or by two men, members of the same family: and if there shall be any violation of this section in any of its provisions, then the master of the vessel and the owners thereof shall severally forfeit and pay the sum of five dollars for each passenger on board of said vessel on such voyage, to be recovered by the United States in any port where such vessel may arrive or depart.

SECT. 3. *And be it further enacted*, That all vessels, whether of the United States or any foreign country, having sufficient capacity or space, according to law, for fifty or more passengers (other than cabin passengers), shall, when employed in transporting such passengers between the United States and Europe, have, on the upper deck, for the use of such passengers, a house over the passage-way leading to the apartments allotted to such passages below deck, firmly secured to the deck or coamings of the hatch, with two doors, the sills of which shall be at least one foot above the deck, so constructed that one door or window in such house may at all times be left open for ventilation; and all vessels so employed, and having the capacity to carry one hundred and fifty such passengers or more, shall have two such houses; and the stairs or ladder, leading down to the aforesaid apartment, shall be furnished with a hand-rail of wood or strong rope; but booby-hatches may be substituted for such houses.

SECT. 4. *And be it further enacted*, That every such vessel so employed, and having the legal capacity for more than one hundred such passengers, shall have at least two ventilators to purify the apartment or apartments occupied by such passengers, one of which shall be inserted in the after part of the apartment or apartments, and the other shall be placed in the forward portion of the apartment or apartments; and one of them shall have an exhausting-cap to carry off the foul air, and the other a receiving-cap to carry down the fresh air; which said ventilators shall have a capacity proportioned to the size of the apartment or apartments to be purified; namely, if the apartment or apartments will lawfully authorize the reception of two hundred such passengers, the capacity of such ventilators shall be equal to a tube of twelve inches diameter in the clear, and in proportion for larger or smaller apartments; and all said ventilators shall rise at least four feet six inches above the upper deck of any such vessel, and be of the most approved form and construction; but if it shall appear, from the report, to be made and approved, as hereinafter provided, that such vessel is equally well ventilated by any other means, such other means of ventilation shall be deemed and held to be a compliance with the provisions of this section.

SECT. 5. *And be it further enacted*, That every vessel carrying more than fifty such passengers shall have for their use on deck, housed and conveniently arranged, at least one camboose or cooking-range, the dimensions of which shall be equal to four feet long and one foot six inches wide for every two hundred passengers; and provision shall be made in the manner aforesaid, in this ratio, for a greater or less number of passengers; but nothing herein contained shall take away the right to make such arrangements for cooking between decks, if that shall be deemed desirable.

SECT. 6. *And be it further enacted*, That all vessels employed as aforesaid shall have on board, for the use of such passengers, at the time of leaving the last port whence such vessel shall sail, well secured under deck, for each passenger, at least twenty pounds of good navy bread, fifteen pounds of rice, fifteen pounds of oatmeal, ten pounds of wheat-flour, fifteen pounds of peas and beans, twenty pounds of potatoes, one pint of vinegar, sixty gallons of fresh water, ten pounds of salted pork, and ten pounds of salt beef, free of bone, all to be of good quality; but at places where either rice, oatmeal, wheat-flour, or peas and beans cannot be procured, of good quality and on reasonable terms, the quantity of either or any of the other last-named articles may be increased and substituted therefor; and, in case potatoes cannot be procured on reasonable terms, one pound of either of said articles may be substituted in lieu of five pounds of potatoes; and the captains of such vessels shall deliver to each passenger at least one-tenth part of the aforesaid provisions weekly, commencing on the day of sailing, and at least three quarts of water daily; and if the passengers on board of any such vessel in which the provisions and water herein required shall not have been provided as aforesaid, shall, at any time, be put on short allowance during any voyage, the master or owner of any such vessel shall pay to each and every passenger who shall have been put on short allowance, the sum of three dollars for each and every day they may have been put on short allowance, to be recovered in the circuit or district court of the United States; and it shall be the duty of the captain or master of every such ship or vessel to cause the food and provisions of all the passengers to be well and properly cooked daily, and to be served out and distributed to them at regular and stated hours, by messes, or in such other manner as shall be deemed best and most conducive to the health and comfort of such passengers, of which

hours and manner of distribution due and sufficient notice shall be given. If the captain or master of any such ship or vessel shall wilfully fail to furnish and distribute such provisions, cooked as aforesaid, he shall be deemed guilty of a misdemeanor, and, upon conviction thereof before any circuit or district court of the United States, shall be fined not more than one thousand dollars, and shall be imprisoned for a term not exceeding one year: *provided*, that the enforcement of this penalty shall not affect the civil responsibility of the captain or master and owners, to such passenger as may have suffered from said default.

SECT. 7. *And be it further enacted*, That the captain of any such vessel so employed is hereby authorized to maintain good discipline and such habits of cleanliness among such passengers as will tend to the preservation and promotion of health; and to that end he shall cause such regulations as he may adopt for this purpose to be posted up, before sailing, on board such vessel, in a place accessible to such passengers, and shall keep the same so posted up during the voyage; and it is hereby made the duty of said captain to cause the apartments occupied by such passengers to be kept at all times in a clean, healthy state; and the owners of every such vessel so employed are required to construct the decks and all parts of said apartment so that it can be thoroughly cleansed; and they shall also provide a safe, convenient privy or water-closet for the exclusive use of every one hundred such passengers. And when the weather is such that said passengers cannot be mustered on deck with their bedding, it shall be the duty of the captain of every such vessel to cause the deck, occupied by such passengers, to be cleansed with chloride of lime, or some other equally efficient disinfecting agent, and also at such other times as said captain may deem necessary.

SECT. 8. *And be it further enacted*, That the master and owner or owners of any such vessel so employed, which shall not be provided with the house or houses over the passage-ways as prescribed in the third section of this chapter, or with ventilators as prescribed in the fourth section of this chapter, or with cambooses or cooking-ranges, with the houses over them, as prescribed in the fifth section of this chapter, shall severally forfeit and pay to the United States the sum of two hundred dollars for each and every violation of, or neglect to conform to, the provisions of each of said sections, and fifty dollars for each and every neglect or violation of any of the provisions of the seventh section of this chapter, to be recovered by suit in any circuit or district court of the United States within the jurisdiction of which the said vessel may arrive, or from which she may be about to depart, or at any place within the jurisdiction of such courts, wherever the owner or owners, or captain of such vessel may be found.

SECT. 9. *And be it further enacted*, That the collector of customs at any port of the United States at which any vessel so employed shall arrive, or from which any such vessel shall be about to depart, shall appoint and direct one or more of the inspectors of the customs for such port to examine such vessel, and report in writing to such collector whether the requirements of law have been complied with in respect to such vessel; and if such report shall state such compliance, and shall be approved by such collector, it shall be deemed and held as *prima facie* evidence thereof.

SECT. 10. *And be it further enacted*, That the provisions, requisitions, penalties, and liens of this Act, relating to the space in vessels appropriated to the use of passengers, are hereby extended and made applicable to all spaces appropriated to the use of steerage passengers in vessels propelled in whole or in part by steam, and navigating from, to, and between the ports, and in manner as in this Act

named, and to such vessels and to the masters thereof; and so much of the Act entitled "An Act to amend an Act entitled 'An Act to provide for the better security of the lives of passengers on board of vessels propelled in whole or in part by steam, and for other purposes,' approved August thirty, eighteen hundred and fifty-two," as conflicts with this Act, is hereby repealed; and the space appropriated to the use of steerage passengers in vessels so as above propelled and navigated, is hereby subject to the supervision and inspection of the collector of the customs at any port of the United States at which any such vessel shall arrive, or from which she shall be about to depart; and the same shall be examined and reported in the same manner and by the same officers by the next preceding section directed to examine and report.

SECT. 11. *And be it further enacted*, That the vessels bound from any port in the United States to any port or place in the Pacific Ocean, or on its tributaries, or from any such port or place to any port in the United States on the Atlantic or its tributaries, shall be subject to the foregoing provisions regulating the carriage of passengers in merchant vessels, except so much as relates to provisions and water; but the owners and masters of all such vessels shall in all cases furnish to each passenger the daily supply of water therein mentioned, and they shall furnish a sufficient supply of good and wholesome food, properly cooked; and in case they shall fail so to do, or shall provide unwholesome or unsuitable provisions, they shall be subject to the penalty provided in the sixth section of this chapter, in case the passengers are put on short allowance of water or provisions.

SECT. 12. *And be it further enacted*, That the captain or master of any ship or vessel arriving in the United States, or any of the territories thereof, from any foreign place whatever, at the same time that he delivers a manifest of the cargo, and if there be no cargo, then at the time of making report or entry of the ship or vessel, pursuant to law, shall also deliver and report to the collector of the district in which such ship or vessel shall arrive a list or manifest of all the passengers taken on board of the said ship or vessel at any foreign port or place; in which list or manifest it shall be the duty of the said master to designate particularly the age, sex, and occupation of the said passengers respectively, the part of the vessel occupied by each during the voyage, the country to which they severally belong, and that of which it is their intention to become inhabitants; and shall further set forth whether any and what number have died on the voyage; which list or manifest shall be sworn to by the said master, in the same manner as directed by law in relation to the manifest of the cargo; and the refusal or neglect of the master aforesaid to comply with the provisions of this section, or any part thereof, shall incur the same penalties, disabilities, and forfeitures as are provided for a refusal or neglect to report and deliver a manifest of the cargo aforesaid.

SECT. 13. *And be it further enacted*, That each and every collector of the customs to whom such manifest or list of passengers as aforesaid shall be delivered shall quarter-yearly return copies thereof to the Secretary of State of the United States, by whom statements of the same shall be laid before Congress at each and every session.

SECT. 14. *And be it further enacted*, That in case there shall have occurred on board any ship or vessel arriving at any port or place within the United States or its territories any death or deaths among the passengers (other than cabin passengers), the master or captain or owner or consignee of such ship or vessel shall, within twenty-four hours after the time within which the report and list or manifest of passengers mentioned in section twelve of this Act is required to be delivered

to the collector of the customs, pay to the said collector the sum of ten dollars for each and every passenger above the age of eight years who shall have died on the voyage by natural disease; and the said collector shall pay the money thus received, at such times and in such manner as the Secretary of the Treasury, by general rules, shall direct, to any board or commission appointed by and acting under the authority of the State within which the port where such ship or vessel arrived is situated, for the care and protection of sick, indigent, or destitute emigrants, to be applied to the objects of their appointment; and if there be more than one board or commission who shall claim such payment, the Secretary of the Treasury for the time being shall determine which is entitled to receive the same, and his decision in the premises shall be final and without appeal: *provided*, that the payment shall, in no case, be awarded or made to any board or commission or association formed for the protection or advancement of any particular class of emigrants, or emigrants of any particular nation or creed; and if the master, captain, owner, or consignee of any ship or vessel refuse or neglect to pay to the collector the sum and sums of money required, and within the time prescribed by this section, he or they shall severally forfeit and pay the sum of fifty dollars, in addition to such sum of ten dollars, for each and every passenger upon whose death the same has become payable, to be recovered by the United States in any circuit or district court of the United States where such vessel may arrive, or such master, captain, owner, or consignee may reside; and, when recovered, the said money shall be disposed of in the same manner as is directed with respect to the sum and sums required to be paid to the collector of customs.

SECT. 15. *And be it further enacted*, That the amount of the several penalties imposed by the foregoing provisions regulating the carriage of passengers in merchant vessels shall be liens on the vessel or vessels violating these provisions, and such vessel or vessels shall be libelled therefor in any circuit or district court of the United States where such vessel or vessels shall arrive.

SECT. 16. *And be it further enacted*, That all and every vessel or vessels which shall or may be employed by the American Colonization Society, or the colonization society of any State, to transport, and which shall actually transport, from any port or ports of the United States to any colony or colonies on the west coast of Africa, colored emigrants, to reside there, shall be, and the same are hereby, subjected to the operation of the foregoing provisions regulating the carriage of passengers in merchant vessels.

SECT. 17. *And be it further enacted*, That the collector of the customs shall examine each emigrant ship or vessel on its arrival at his port, and ascertain and report to the Secretary of the Treasury the time of sailing, the length of the voyage, the ventilation, the number of passengers, their space on board, their food, the native country of the emigrants, the number of deaths, the age and sex of those who died on the voyage, together with his opinion of the cause of the mortality, if any, on board, and, if none, what precautionary measures, arrangements, or habits are supposed to have had any, and what, agency, in causing the exemption.

SECT. 18. *And be it further enacted*, That this Act shall take effect, with respect to vessels sailing from ports in the United States on the eastern side of the continent, within thirty days from the time of its approval; and with respect to vessels sailing from ports in the United States on the western side of the continent, and from ports in Europe, within sixty days from the time of its approval; and with respect to vessels sailing from ports in other parts of the world, within six months from the time of its approval. And it is hereby made the duty of the

Secretary of State to give notice in the ports of Europe, and elsewhere, of this Act, in such manner as he shall deem proper.

SECT. 19. *And be it further enacted*, That from and after the time that this Act shall take effect with respect to any vessels, then, in respect to such vessels, the Act of second March, eighteen hundred and nineteen, entitled "An Act regulating passenger ships and vessels;" the Act of twenty-second February, eighteen hundred and forty-seven, entitled "An Act to regulate the carriage of passengers in merchant vessels;" the Act of second March, eighteen hundred and forty-seven, entitled "An Act to amend an Act entitled 'An Act to regulate the carriage of passengers in merchant vessels,' and to determine the time when said Act shall take effect;" the Act of thirty-first January, eighteen hundred and forty-eight, entitled "An Act exempting vessels, employed by the American Colonization Society in transporting colored emigrants from the United States to the coast of Africa, from the provisions of the Acts of the twenty-second February and second of March, eighteen hundred and forty-seven, regulating the carriage of passengers in merchant vessels;" the Act of seventeenth May, eighteen hundred and forty-eight, entitled "An Act to provide for the ventilation of passenger vessels, and for other purposes;" and the Act of third March, eighteen hundred and forty-nine, entitled "An Act to extend the provisions of all laws now in force relating to the carriage of passengers in merchant vessels, and the regulation thereof,"—are hereby repealed. But nothing in this Act contained shall in any wise obstruct or prevent the prosecution, recovery, distribution, or remission of any fines, penalties, of forfeitures, which may have been incurred in respect to any vessels prior to the day this Act goes into effect, in respect to such vessels, under the laws hereby repealed, for which purpose the said laws shall continue in force. But the Secretary of the Treasury may, in his discretion, and upon such conditions as he shall think proper, discontinue any such prosecutions, or remit or modify such penalties. [*Approved March 3, 1855.*

APPENDIX VII.

AN ACT TO AMEND THE ACT ENTITLED "AN ACT TO REGULATE THE CARRIAGE OF PASSENGERS IN STEAMSHIPS AND OTHER VESSELS," APPROVED MARCH THREE, EIGHTEEN HUNDRED AND FIFTY-FIVE.

Be it enacted, etc., That the thirteenth section of the Act entitled "An Act to regulate the carriage of passengers in steamships and other vessels," approved March three, eighteen hundred and fifty-five, be, and the same is, hereby repealed; and that hereafter each and every collector of customs to whom shall be delivered the manifests or lists of passengers prescribed by the twelfth section of the Act aforesaid, approved March three, eighteen hundred and fifty-five, shall make returns from such manifests or lists of passengers to the Secretary of the Treasury of the United States, in such manner as shall be prescribed by that officer, under whose direction statements of the same shall be prepared and published. [*Approved May 7, 1874.*

APPENDIX VIII.

AN ACT TO AMEND AN ACT ENTITLED "AN ACT TO REGULATE THE CARRIAGE OF PASSENGERS IN STEAMSHIPS AND OTHER VESSELS," APPROVED MARCH THREE, EIGHTEEN HUNDRED AND FIFTY-FIVE, FOR THE BETTER PROTECTION OF FEMALE PASSENGERS, AND OTHER PURPOSES.

Be it enacted, etc., That every master or other officer, seaman, or other person employed on board of any ship or vessel of the United States who shall, during the voyage of such ship or vessel, under promise of marriage, or by threats, or by the exercise of his authority, or by solicitation, or the making of gifts or presents, seduce and have illicit connection with any female passenger, shall be guilty of a misdemeanor, and, upon conviction, shall be punished by imprisonment for a term not exceeding twelve months, or by a fine not exceeding one thousand dollars: *provided*, that the subsequent intermarriage of the parties seducing and seduced may be pleaded in bar of a conviction.

SECT. 2. *And be it further enacted*, That neither the officers, seamen, or other persons employed on board of any ship or vessel bringing emigrant passengers to the United States, or any of them, shall visit or frequent any part of such ship or vessel assigned to emigrant passengers, except by the direction or permission of the master or commander of such ship or vessel first made or given for such purpose; and every officer, seaman, or other person employed on board of such ship or vessel who shall violate the provisions of this section shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall forfeit to the said ship or vessel his wages for the voyage of the said ship or vessel during which the said offence has been committed. Any master or commander who shall direct or permit any officer or seaman or other person employed on board of such ship or vessel to visit or frequent any part of said ship or vessel assigned to emigrant passengers, except for the purpose of doing or performing some necessary act or duty as an officer, seaman, or person employed on board of said ship or vessel, shall be deemed guilty of a misdemeanor, and shall, on conviction thereof, be punished by a fine of fifty dollars for each occasion on which he shall so direct or permit the provisions of this section to be violated by any officer, seaman, or other person employed on board such ship or vessel.

SECT. 3. *And be it further enacted*, That it shall be the duty of the master or commander of every ship or vessel bringing emigrant passengers to the United States to post a written or printed notice, in the English, French, and German languages, containing the provisions of the second section of this Act, in a conspicuous place on the forecastle and in the several parts of the said ship or vessel assigned to emigrant passengers, and to keep the same so posted during the voyage; and upon neglect so to do, he shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding five hundred dollars.

SECT. 4. *And be it further enacted*, That, in case of the conviction of any person under the provisions of the first section of this Act, and the imposition of a fine, the court sentencing the person so committed, may, in its discretion, by an order to be entered on its minutes, direct the amount of the fine, when collected, to be paid for the use or benefit of the female seduced, or her child or children, if any.

SECT. 5. *And be it further enacted*, That no conviction shall be had under

the provisions of this Act on the testimony of the female seduced uncorroborated by other evidence, nor unless the indictment shall be found within one year after the arrival of the ship or vessel at the port for which she was destined when the offence was committed. [*Approved March 24, 1860.*

APPENDIX IX.

[In the House of Representatives. April 8, 1880.]

A Bill to regulate the Carriage of Passengers by Sea.

Be it enacted, etc., That it shall not be lawful for the master of a steamship or other vessel, whereon emigrant passengers, or passengers other than cabin passengers, have been taken at any port or place in a foreign country or dominion (ports and places in foreign territory contiguous to the United States excepted), to bring such vessel and passengers to any port or place in the United States, unless the compartments, spaces, and accommodations hereinafter mentioned have been provided, allotted, maintained, and used for and by such passengers during the entire voyage; that is to say, in a steamship, the compartments or spaces, unobstructed by cargo, stores, or goods, shall be of sufficient dimensions to allow, for each and every passenger carried or brought therein, one hundred cubic feet, if the compartment or space is located on the first deck next below the uppermost deck of the vessel, or in a poop or deck-house constructed on the main deck of the vessel; and one hundred and twenty cubic feet for each passenger carried or brought therein, if the compartment or space is located on the second deck below the uppermost deck of the vessel; and it shall not be lawful to carry or bring passengers on any deck other than the two decks above mentioned, and in the aforesaid poop or deck-houses. And in sailing-vessels such passengers shall be carried or brought only on the deck (not being an orlop deck) that is next below the uppermost deck of the vessel, or in a poop or deck-house constructed on the main deck; and the compartment or space, unobstructed by cargo, stores, or goods, shall be of sufficient dimensions to allow one hundred and twenty cubic feet for each and every passenger brought therein. And such passengers shall not be carried or brought in any between-decks, nor in any compartment, space, poop, or deck-house, the clear height of which is less than seven feet. In computing the number of such passengers carried or brought in any vessel, children under one year of age shall not be included, and two children between one and eight years of age shall be counted as one passenger; and any persons brought in such vessel, who shall have been, during the voyage, taken from any other vessel wrecked or in distress on the high seas, or have been picked up at sea from any boat, raft, or otherwise, shall not be included in such computation. The master of a vessel coming to a port or place in the United States in violation of either of the provisions of this section, shall be deemed guilty of a misdemeanor; and if the number of passengers, other than cabin passengers, carried or brought in the vessel, or in any compartment, space, poop, or deck-house thereof, is greater than the number allowed to be carried or brought therein respectively, as hereinbefore prescribed, the said master shall be fined fifty dollars for each and every passenger in excess of the proper number, and may also be imprisoned not exceeding six months.

Sect. 2. *And be it further enacted*, That in every such steamship or other vessel, there shall be a sufficient number of berths for the proper accommodation,

as hereinafter provided, of all such passengers. There shall not be on any deck, nor in any compartment or space occupied by such passengers, more than two tiers of berths. The berths shall be properly constructed, parallel with the sides of the vessel, and be separated from each other by partitions, as berths ordinarily are separated, and each berth shall be at least two feet in width and six feet in length ; and the interval between the floor or lowest part of the lower tier of berths and the deck beneath them shall not be less than six inches, nor the interval between each tier of berths, and the interval between the uppermost tier and the deck above it, less than two feet six inches, and each berth shall be occupied by not more than one passenger over eight years of age; but double berths of twice the above-mentioned width may be provided, each double berth to be occupied by no more and by none other than two women, or by one woman and two children under the age of eight years, or by husband and wife, or by a man and two of his own children under the age of eight years, or by two men, members of the same family. All the male passengers, upwards of fourteen years of age, who do not occupy berths with their wives, shall be berthed in the fore part of the vessel, in a compartment divided off from the space or spaces appropriated to the other passengers by a substantial and well-secured bulkhead, without opening or communication with any adjoining passenger space; and unmarried female passengers shall be berthed in a compartment separated from the spaces occupied by other passengers by a substantial and well-constructed bulkhead, the opening or communication from which to any adjoining passenger space shall be so constructed that it can be closed and secured. Each berth shall be numbered serially, on the outside berth-board, according to the number of passengers that may lawfully occupy the berth; and the berths occupied by such passengers shall not be removed or taken down until they have been inspected by a customs officer as hereinafter provided. For any violation of either of the provisions of this section, the master of the vessel shall be liable to a fine of five dollars for each passenger carried or brought on the vessel.

SECT. 3. *And be it further enacted*, That every such steamship or other vessel shall have adequate provision for affording light and air to the passenger decks and to the compartments and spaces occupied by such passengers, and with adequate means and appliances for ventilating the said compartments and spaces. To compartments having sufficient space for fifty or more of such passengers, at least two ventilators, each not less than twelve inches in diameter, shall be provided, one of which ventilators shall be inserted in the forward part of the compartment, and the other in the after part thereof, and shall be so constructed as to ventilate the compartment; and additional ventilators shall be provided for each compartment, in the proportion of two ventilators for each additional fifty of such passengers carried or brought in the compartment. All ventilators shall be carried at least six feet above the uppermost deck of the vessel, and shall be of the most approved form and construction. In any steamship the ventilating apparatus provided, or any method of ventilation adopted thereon, which has been approved by the proper emigration officers at the port or place from which said vessel was cleared, shall be deemed a compliance with the foregoing provisions; and in all vessels carrying or bringing such passengers, there shall be properly constructed hatchways over the compartments or spaces occupied by such passengers, which hatchways shall be properly covered with houses or booby-hatches, and the coamings or sills of which shall rise at least one foot above the deck; and the said houses shall have a door on each side, so constructed as to afford the greatest

amount of light and air and of protection from wet that the case will admit; and there shall be proper companion-ways or ladders from each hatchway leading to the compartments or spaces occupied by such passengers; and the said companion-ways or ladders shall be securely constructed, and be provided with hand-rails or strong rope, and such passengers shall have the free and unimpeded use of the whole of each hatchway situated over the compartments or spaces appropriated to their use; and every vessel carrying or bringing such passengers shall have a properly located and constructed camboose and cooking-range, or other cooking apparatus, the dimensions and capacity of which shall be sufficient to provide for properly cooking and preparing the food of all such passengers. In every vessel carrying or bringing such passengers, there shall be at least two water-closets or privies, and an additional water-closet or privy for every one hundred male passengers on board, for the exclusive use of such male passengers, and an additional water-closet or privy for every fifty female passengers on board, for the exclusive use of the female passengers and young children on board. The aforesaid water-closets and privies shall be properly enclosed, and located on each side of the vessel, and shall be separated from passengers' spaces by substantial and properly constructed partitions or bulkheads; and the water-closets and privies shall be kept and maintained in a serviceable and cleanly condition throughout the voyage.

For any violation of either of the provisions of this section, or for any neglect to conform to the requirements thereof, the master of the vessel shall be liable to a penalty not exceeding two hundred and fifty dollars.

SECT. 4. *And be it further enacted*, That every such steamship or other vessel shall have on board during the voyage, properly stored and secured, a supply of good and wholesome food, provisions, and water, sufficient to provide for the daily distribution to each of such passengers while on board the vessel an allowance of food and provisions equal, for the first twenty days of the voyage, in value to at least fifty cents, United States money, per head, and to be of good and wholesome character and of sufficient quantity, and to be served on tables with seats around, as now is customary in the second cabin of the transatlantic steamships, the computations of the fifty cents' value to be made in bulk at the rate of fifty dollars for every hundred passengers. Mothers with infants and young children shall be furnished the necessary quantity of wholesome milk or condensed milk for the sustenance of the latter. On sailing-vessels and on steamships, for the time after the first twenty days of the voyage, an allowance of food and provisions equal in quality and quantity to a navy ration of the United States, and of water not less than three quarts per day, shall be furnished each of such passengers. Three meals shall be served daily at regular and stated hours, of which hours sufficient notice shall be given. If any such passenger shall, at any time during the voyage, be put upon short allowance of food or water, the master of the vessel shall pay to such passenger three dollars for each and every day the passenger may have been put on short allowance. And for every wilful violation of any of the provisions of this section, the master of the vessel shall be deemed guilty of a misdemeanor, and shall be fined not more than five hundred dollars, and be imprisoned for a term not exceeding six months. The enforcement of this penalty, however, shall not affect the civil responsibility of the master and owners of the vessel to such passengers as may have suffered from any negligence, breach of contract, or default on the part of such master and owners.

SECT. 5. *And be it further enacted*, That in every such steamship or other vessel, there shall be properly built and secured, or divided off from other spaces,

two compartments or spaces to be used exclusively as hospitals for such passengers, one for men, and the other for women; the hospitals shall be located in a deck-house constructed on the main deck or on the deck next below the uppermost deck of the vessel, and not elsewhere; the hospital spaces shall in no case be less than in the proportion of eighteen clear superficial feet for every fifty such passengers who are carried or brought on the vessel, and such hospitals shall be supplied with proper beds, bedding, and utensils, and be kept so filled and supplied throughout the voyage. And every steamship or other vessel carrying or bringing emigrant passengers, or passengers other than cabin passengers, exceeding fifty in number, shall carry a duly qualified and competent surgeon or medical practitioner, who shall be rated as such in the ship's articles, and who shall be provided with surgical instruments, medical comforts, and medicines proper and necessary for diseases and accidents incident to sea-voyages, and for the proper medical treatment of such passengers during the voyage, and with such articles of food and nourishment as may be proper and necessary for preserving the health of infants and young children; and the services of such surgeon or medical practitioner shall be promptly given, in any case of sickness or disease, to any of the passengers, or to any infant or young child of any of such passengers who may need his services. For a violation of either of the provisions of this section, the master of the vessel shall be liable to a penalty not exceeding two hundred and fifty dollars.

SECT. 6. *And be it further enacted*, That the master of every such steamship or other vessel is authorized to maintain good discipline, and such habits of cleanliness among such passengers as will tend to the preservation and promotion of health, and to that end he shall cause such regulations as he may adopt for such purpose to be posted up on board the vessel, in a place or places accessible to such passengers, and shall keep the same so posted up during the voyage; the said master shall cause the compartments and spaces provided for or occupied by such passengers, to be kept at all times in a clean and healthy condition, and to be, as often as may be necessary, disinfected with chloride of lime, or by some other equally efficient disinfectant. Whenever the state of the weather will permit, such passengers and their bedding shall be mustered on deck, and a clear and sufficient space on the uppermost deck of the vessel shall be set apart, and so kept, for the use and exercise of such passengers during the voyage. For each neglect or violation of any of the provisions of this section, the master of the vessel shall be liable to a penalty not exceeding two hundred and fifty dollars.

SECT. 7. *And be it further enacted*, That neither the officers, seamen, nor other persons employed on any such steamship or other vessel shall visit or frequent any part of the vessel provided or assigned to the use of such passengers, except by the direction or permission of the master of such vessel first made or given for such purpose; and every officer, seaman, or other person employed on board of such vessel, who shall violate the provisions of this section, shall be deemed guilty of a misdemeanor, and may be fined not exceeding one hundred dollars, and be imprisoned not exceeding twenty days for each violation; and the master of such vessel who directs or permits any officer, seaman, or other person employed on board the vessel, to visit or frequent any part of the vessel provided for or assigned to the use of such passengers, or the compartments or spaces occupied by such passengers, except for the purpose of doing or performing some necessary act or duty as an officer, seaman, or other person employed on board of the vessel, shall be deemed guilty of a misdemeanor, and may be fined not more

than one hundred dollars for each time he directs or permits the provisions of this section to be violated. A copy of this section, written or printed in the language or languages of the passengers on board, shall, by or under the direction of the master of the vessel, be posted in a conspicuous place on the forecastle and in the several parts of the vessel provided and assigned for the use of such passengers, and in each compartment or space occupied by such passengers, and the same shall be kept so posted during the voyage; and if the said master neglects so to do, he shall be deemed guilty of a misdemeanor, and shall be fined not more than one hundred dollars.

SECT. 8. *And be it further enacted*, That it shall not be lawful to take, carry, or have on board of any such steamship or other vessel any nitro-glycerine, dynamite, or any other explosive article or compound, nor any vitriol or like acids, nor gunpowder, except for the ship's use, nor any article or number of articles, whether as cargo or ballast, which, by reason of the nature or quantity or mode of storage thereof, shall, either singly or collectively, be likely to endanger the health or lives of the passengers or the safety of the vessel; and horses, cattle, or other animals taken on board of or brought in any such vessel shall not be carried on any deck below the deck on which passengers are berthed, nor in any compartment in which passengers are berthed, nor in any adjoining compartment, except in a vessel built of iron, and of which the compartments are divided off by water-tight bulkheads extending to the upper deck. For every violation of any of the provisions of this section the master of the vessel shall be deemed guilty of a misdemeanor, and shall be fined not exceeding one thousand dollars and be imprisoned for a period not exceeding one year.

SECT. 9. *And be it further enacted*, That it shall not be lawful for the master of any such steamship or other vessel, not in distress, after the arrival of the vessel within any collection-district of the United States, to allow any person or persons, except a pilot, officer of the customs, or health officer, to come on board of the vessel, or to leave the vessel, until the vessel has been taken in charge by an officer of the customs, nor after charge so taken, without leave of such officer, until all the passengers with their baggage have been duly landed from the vessel; and on the arrival of any such steamship or other vessel within any collection-district of the United States, the master thereof shall deliver to the officer of customs who first comes on board the vessel and makes demand therefor, a correct list, signed by the master, of all the passengers taken on board the vessel at any foreign port or place, specifying separately the names of the cabin passengers, their age, sex, calling, and the country of which they are citizens, and the number of pieces of baggage belonging to each passenger, and also the name, age, sex, calling, and native country of each emigrant passenger, or passengers other than cabin passengers, and their intended destination or location, and the number of pieces of baggage belonging to each passenger, and also the location of the compartment or space occupied by each of such passengers during the voyage; and if any of such passengers died on the voyage, the said list shall specify the name, age, and cause of death of each deceased passenger; and a duplicate of the aforesaid list of passengers, verified by the oath of the master, shall, with the manifest of the cargo, be delivered by the master to the collector of customs on the entry of the vessel. For a violation of either of the provisions of this section, or for permitting or neglecting to prevent a violation thereof, the master of the vessel shall be liable to a fine not exceeding one thousand dollars.

SECT. 10. *And be it further enacted*, That in case there shall have occurred

on board any such steamship or other vessel any death among such passengers during the voyage, the master or consignees of the vessel shall, within forty-eight hours after the arrival of the vessel within a collection-district of the United States, or within twenty-four hours after the entry of the vessel, pay to the collector of customs of such district the sum of ten dollars for each and every such passenger above the age of eight years who shall have died on the voyage by natural disease; and the master or consignees of any vessels, who neglects or refuses to pay to such collector, within the times hereinbefore prescribed, the sums of money aforesaid, shall be liable to a penalty of fifty dollars in addition to the sum required to be paid as aforesaid for each passenger whose death occurred on the voyage. All sums of money paid to any collector, under the provisions of this section, shall be by him paid into the Treasury of the United States in such manner and under such regulations as shall be prescribed by the Secretary of the Treasury.

SECT. 11. *And be it further enacted*, That the collector of customs of the collection-district within which, or the surveyor of the port of which, any such steamship or other vessel arrives, shall direct an inspector or other officer of the customs to make an examination of the vessel, and to admeasure the compartments or spaces occupied by the emigrant passengers, or passengers other than cabin passengers, during the voyage (and such measurements shall be made in the manner provided by law for admeasuring vessels for tonnage); and to compare the number of such passengers found on board with the list of such passengers furnished by the master to the customs officer; and the said inspector or other officer shall make a report to the aforesaid collector or surveyor, stating the port of departure, the time of sailing, the length of the voyage, the ventilation, the number of such passengers on board the vessel, and their native country respectively; the cubic quantity of each compartment or space, and the number of berths and passengers in each space; the kind and quality of the food furnished to such passengers on the voyage, the number of deaths, and the age and sex of those who died during the voyage, and of what disease; and in case there was any unusual sickness or mortality during the voyage, to report whether the same was caused by any neglect or violation of the provisions of this Act, or by the want of proper care against disease by the master or owner of the vessel; and the said reports shall be forwarded to the Secretary of the Treasury at such times and in such manner as he shall direct.

SECT. 12. *And be it further enacted*, The provisions of this Act shall apply to every steamship or other vessel whereon emigrant passengers, or passengers other than cabin passengers, are taken on board at a port or place in the United States for conveyance to any port or place in a foreign country, except foreign territory contiguous to the United States, and shall also apply to any vessel whereon such passengers are taken on board at any port or place of the United States on the Atlantic Ocean or its tributaries for conveyance to a port or place on the Pacific Ocean or its tributaries, or *vice versa*, and whether the voyage of said vessel is to be continuous from port to port, or such passengers are to be conveyed from port to port in part by the way of any overland route through Mexico or Central America; and before any such vessel shall be cleared from, or may lawfully depart from, the port or place where such passengers are taken on board, the master of such vessel shall furnish to the collector of customs of the district from which such vessel is about to depart, a correct list of all passengers who have been, or are intended to be, taken on board the vessel; and the said list shall specify the age, sex, and nationality of each passenger, and whether the said pas-

sengers are cabin or other passengers, and the location of the compartment or space in the vessel provided and intended for the use of the passengers other than cabin passengers; and the said collector of customs may direct an examination of the vessel to be made by an inspector or other officer of the customs, who shall make the examination and report whether the provisions of this Act have been complied with in respect to such vessel, and the said collector is authorized to withhold the clearance of such vessel until the coming in of such report; and if the said report shall show that any of the provisions of this Act have not been complied with, the collector is authorized and directed to withhold the clearance of such vessel until the said provisions are complied with; and if the master of any such vessel shall wilfully present or cause to be presented to the aforesaid collector of customs any false or fraudulent list or lists of such passengers, or if any such vessel leaves the aforesaid port or place without having been duly cleared by the collector of customs, the master shall be deemed guilty of a misdemeanor, and may be fined not exceeding one thousand dollars and be imprisoned not exceeding one year, and the vessel shall be liable to seizure and forfeiture.

SECT. 13. *And be it further enacted*, That the amount of the several fines and penalties imposed by any section of this Act upon the master of any steamship or other vessel carrying or bringing emigrant passengers, or passengers other than cabin passengers, for any violation of the provisions of this Act, shall be liens upon such vessel, and such vessel may be libelled therefor in any circuit or district court of the United States where such vessel shall arrive or depart.

SECT. 14. *And be it further enacted*, That this Act shall come into operation and take effect on the day of , eighteen hundred and eighty; and sections forty-two hundred and fifty-two to forty-two hundred and seventy-seven inclusive, of the Revised Statutes of the United States, are, from and after said date, repealed; and this Act may be cited for all purposes as "The Passenger Act, eighteen hundred and eighty."

APPENDIX X.

MODE OF MEASUREMENT. REVISED STATUTES.

SECT. 4150. The registry of every vessel shall express her length and breadth, together with her depth, and the height under the third or spar deck, which shall be ascertained in the following manner: the tonnage-deck, in all vessels having three or more decks to the hull, shall be the second deck from below; in all other cases, the upper deck of the hull is to be the tonnage-deck. The length from the fore part of the outer planking on the side of the stem to the after part of the main stern-port of screw-steamers, and to the after part of the rudder-port of all other vessels, measured on the top of the tonnage-deck, shall be accounted the vessel's length. The breadth of the broadest part on the outside of the vessel shall be accounted the vessel's breadth of beam. A measure from the under side of the tonnage-deck plank, amidships, to the ceiling of the hold (average thickness), shall be accounted the depth of hold. If the vessel has a third deck, then the height from the top of the tonnage-deck plank to the under side of the upper-deck plank shall be accounted as the height under the spar-deck. All measurement to be taken in feet and fractions of feet, and all fractions of feet shall be expressed in decimals.

SECT. 4151. No part of any vessel shall be required by the preceding section

to be measured or registered for tonnage that is used for cabins or state-rooms, and constructed entirely above the first deck, which is not a deck to the hull.

SECT. 4153. The register tonnage of every vessel built within the United States, or owned by a citizen or citizens thereof, shall be her entire internal cubical capacity in tons of one hundred cubic feet each, to be ascertained as follows : —

Measure the length of the vessel in a straight line along the upper side of the tonnage-deck, from the inside of the inner plank, average thickness, at the side of the stem to the inside of the plank on the stern-timbers, average thickness, deducting from this length what is due to the rake of the bow in the thickness of the deck, and what is due to the rake of the stern-timber in the thickness of the deck, and also what is due to the rake of the stern-timber in one-third of the round of the beam; divide the length so taken into the number of equal parts required by the following table, according to the class in such table to which the vessel belongs : —

TABLE OF CLASSES.

Class One. — Vessels of which the tonnage-length, according to the above measurement, is fifty feet and under, into six equal parts.

Class Two. — Vessels of which the tonnage-length, according to the above measurement, is about fifty feet and not exceeding one hundred feet, into eight equal parts.

Class Three. — Vessels of which the tonnage-length, according to the above measurement, is above one hundred feet and not exceeding one hundred and fifty feet, into ten equal parts.

Class Four. — Vessels of which the tonnage-length, according to the above measurement, is above one hundred and fifty feet and not exceeding two hundred feet, into twelve equal parts.

Class Five. — Vessels of which the tonnage-length, according to the above measurement, is above two hundred feet and not exceeding two hundred and fifty feet, into fourteen equal parts.

Class Six. — Vessels of which the tonnage-length, according to the above measurement, is above two hundred and fifty feet, into sixteen equal parts.

Then, the hold being sufficiently cleared to admit of the required depths and breadths being properly taken, find the transverse area of such vessel at each point of division of the length as follows : —

Measure the depth at each point of division from a point at a distance of one-third of the round of the beam below such deck ; or, in case of a break, below a line stretched in continuation thereof, to the upper side of the floor-timber, at the inside of the limber-strake, after deducting the average thickness of the ceiling, which is between the bilge-planks and limber-strake ; then, if the depth at the midship division of the length do not exceed sixteen feet, divide each depth into four equal parts ; then measure the inside horizontal breadth at each of the three points of division, and also at the upper and lower points of the depth, extending each measurement to the average thickness of that part of the ceiling which is between the points of measurement ; number these breadths from above, numbering the upper breadth one, and so on down to the lowest breadth ; multiply the second and fourth by four, and the third by two ; add these products together, and to the sum add the first breadth and the last, or fifth ; multiply the quantity thus obtained by one-third of the common interval between the breadths, and the product shall be deemed the transverse area ; but if the midship depth exceed

sixteen feet, divide each depth into six equal parts, instead of four, and measure, as before directed, the horizontal breadths at the five points of division, and also at the upper and lower points of the depth; number them from above as before; multiply the second, fourth, and sixth, by four, and the third and fifth by two; add these products together, and to the sum add the first breadth and the last, or seventh; multiply the quantities thus obtained by one-third of the common interval between the breadths, and the product shall be deemed the transverse area.

Having thus ascertained the transverse area at each point of division of the length of the vessel, as required above, proceed to ascertain the register tonnage of the vessel in the following manner: Number the areas successively one, two, three, and so forth, number one being at the extreme limit of the length at the bow, and the last number at the extreme limit of the length at the stern; then, whether the length be divided, according to the table, into six or sixteen parts, as in classes one and six, or any intermediate number, as in classes two, three, four, and five, multiply the second, and every even-numbered area, by four, and the third, and every odd-numbered area, except the first and last, by two; add these products together, and to the sum add the first and last, if they yield any thing; multiply the quantities thus obtained by one-third of the common interval between the areas, and the product will be the cubical contents of the space under the tonnage-deck; divide this product by one hundred, and the quotient, being the tonnage under the tonnage-deck, shall be deemed to be the register tonnage of the vessel, subject to the additions hereinafter mentioned. If there be a break, a poop, or any other permanent closed-in space on the upper decks or the spar-deck, available for cargo or stores, or for the berthing or accommodation of passengers or crew, the tonnage of such space shall be ascertained as follows: Measure the internal mean length of such space in feet, and divide it into an even number of equal parts, of which the distance asunder shall be most nearly equal to those into which the length of the tonnage-deck has been divided; measure at the middle of its height the inside breadths; namely, one at each end, and at each of the points of division, numbering them successively one, two, three, and so forth; then to the sum of the end breadths add four times the sum of the even-numbered breadths and twice the sum of the odd-numbered breadths, except the first and the last, and multiply the whole sum by one-third of the common interval between the breadths; the product will give the mean horizontal area of such space: then measure the mean height between the planks of the decks, and multiply it by the mean horizontal area; divide the product by one hundred, and the quotient shall be deemed to be the tonnage of such space, and shall be added to the tonnage under the tonnage-decks, ascertained as aforesaid. If a vessel has a third deck or spar-deck, the tonnage of the space between it and the tonnage-deck shall be ascertained as follows: Measure in feet the inside length of the space, at the middle of its height, from the plank at the side of the stem to the plank on the timbers at the stern, and divide the length into the same number of equal parts into which the length of the tonnage-deck is divided; measure, also at the middle of its height, the inside breadth of the space at each of the points of division, also the breadth of the stem and the breadth at the stern; number them successively one, two, three, and so forth, commencing at the stem; multiply the second, and all other even-numbered breadths, by four, and the third, and all the other odd-numbered breadths, except the first and the last, by two; to the sum of these products add the first and last breadths, multiply the whole sum by one-third of the common interval between the breadths, and the

result will give, in superficial feet, the mean horizontal area of such space; measure the mean height between the plank of the two decks, and multiply it by the mean horizontal area, and the product will be the cubical contents of the space; divide this product by one hundred, and the quotient shall be deemed to be the tonnage of such space, and shall be added to the other tonnage of the vessel, ascertained as above directed. And if the vessel has more than three decks, the tonnage of each space between decks, above the tonnage-deck, shall be severally ascertained in the manner above described, and shall be added to the tonnage of the vessel ascertained as above directed. In ascertaining the tonnage of open vessels the upper edge of the upper strake is to form the boundary-line of measurement, and the depth shall be taken from an athwart-ship line, extending from the upper edge of such strake at each division of the length. The register of the vessel shall express the number of decks, the tonnage under the tonnage-deck, that of the between-decks, above the tonnage-deck; also that of the poop or other inclosed spaces above the deck, each separately. In every registered United States vessel the number denoting the total registered tonnage shall be deeply carved or otherwise permanently marked on her main beam, and shall be so continued; and if at any time cease to be so continued, such vessel shall no longer be recognized as a registered vessel of the United States.

MEASUREMENT OF FOREIGN VESSELS. REVISED STATUTES.

SECT. 4154. . . . If the vessel be double-decked, take the length thereof from the fore part of the main stem to the after part of the stern-port, above the upper deck, the breadth thereof at the broadest part above the main wales, half of which breadth shall be accounted the depth of such vessel, and shall then deduct from the length three-fifths of the breadth, multiply the remainder by the breadth, and the product by the depth, and shall divide this last product by ninty-five; the quotient whereof shall be deemed the true contents or tonnage of such vessel. If such vessel be single decked, the surveyor, or other person, shall take the length and breadth as above directed in respect to a double-decked vessel, shall deduct from the length three-fifths of the breadth, and, taking the depth from the under side of the deck-plank to the ceiling in the hold, shall multiply and divide in the same manner, and the quotient shall be deemed the tonnage of such vessel.

APPENDIX XI.

[N. Y. Cat. No. 1087.]

REPORT OF EXAMINATION

Of of tons burden, Capt. , from . Arrived at , , 18 . Date of sailing, . Length of voyage, days. Number, diameter, and description of Ventilators, . Height of Ventilators above Upper Deck, . Number of Decks, .

PASSENGERS.		Males.	Females.	Total No. of Passengers.
CLASS 1. — Cabin Passengers	Eight years of age or over .			
	Under eight years of age .			
Total				
CLASS 2. — Passengers, other than Cabin	Eight years of age or over .			
	Under eight and over one .			
	Under one year of age .			
Total				

SPACE FOR PASSENGERS, OTHER THAN CABIN PASSENGERS.

	Height between Decks.	Superficial Capacity, in feet.	No. of Passengers, other than Cabin Passengers, allowed by Law.	No. of Statute Passengers brought, other than Cabin Passengers.
Main Deck . .				
Lower Deck . .				
Deck-houses . .				
Total . . .				

Food (kinds and daily allowance) .....
How cooked (whether well or badly, etc.) .....
Number, capacity, and arrangement of Hospitals .....

Number of Tiers of Berths . . .
Distance between Berths and Deck beneath . . . . . .
Dimensions of Single Berths . .
Dimensions of Double Berths . .
Number of Physicians on board . .
Number of Houses over Hatchway .
Number of Cabooses . . . .
Number of Latrines for Males . .
Number of Latrines for Females . .

Locality and separation of Latrines .....

NATIVE COUNTRY OF PASSENGERS, OTHER THAN CABIN.

DEATHS AND BIRTHS AMONG PASSENGERS, OTHER THAN CABIN.

DEATHS.		Males.	Females.	BIRTHS.	Number.
PASSENGERS	Above eight years, from natural disease .			Males .	
	" " from other causes .				
	Under eight years of age			Females .	
	Total			Total .	

Causes of mortality during voyage .....
Receipts under sect. 4268, Revised Statutes of the United States .....

REMARKS.

....., 187 . ....., *Examiner.*

To .....

APPENDIX XII.

[Form A.]

No. ____. Port of _____.

THE UNITED STATES OF AMERICA. — NATIONAL BOARD OF HEALTH.

Bill of Health.

I, _____ _____ (consul, consular agent, or other officer empowered by law to sign), at the port of _____, do hereby state that the vessel hereinafter named clears from this port under the following circumstances: —

Name of vessel: _____. Tonnage: _____.

Apartments for passengers, No. _____. Destination: _____.

Name of medical officer (if any): _____ _____.

Total number of passengers: 1st cabin, _____; 2d cabin, _____; steerage, _____.

Nature (vessel-of-war, ship, schooner, etc.): _____. Guns: _____.

Where last from: _____. Name of captain _____.

Total number of crew: _____. Cargo: _____.

Sanitary history of the vessel:

.....

1. Sanitary condition of vessel (before and after reception of cargo, with note of any decayed wood). Note disinfection of vessel:

.....

2. Sanitary condition of cargo:

.....

3. Sanitary condition of crew:

.....

4. Sanitary condition of passengers:

.....

5. Sanitary condition of clothing, food, water, air-space, and ventilation (to be in quantity as required by Revised Statutes):

.....

6. Sanitary condition of port and adjacent country —

a. Prevailing diseases (if any):

.....

b. Number of cases of and deaths from yellow fever, Asiatic cholera, plague, small-pox, or typhus fever during the week preceding:

b. Number of cases of —		*b.* Number of deaths from —	
Yellow fever	_____	Yellow fever	_____
Asiatic cholera	_____	Asiatic cholera	_____
Plague	_____	Plague	_____
Small-pox	_____	Small-pox	_____
Typhus fever	_____	Typhus fever	_____
Relapsing fever	_____	Relapsing fever	_____

7. Any circumstances affecting the public health existing in the port of departure to be here stated:

.....

CLEAN.

I certify that I have personally inspected the said vessel, and that the above statements are correct; that good health is enjoyed in this port and the adjacent country, without any suspicion of yellow fever, Asiatic cholera, or plague; that neither small-pox nor typhus fever exists as an epidemic; that the sanitary condition of the vessel, cargo, crew, and passengers is good; that the rules and regulations prescribed by the National Board of Health have been complied with, and that the [name of vessel] leaves this port in *free pratique*, bound for _____, United States of America.

[Signature of medical officer.]

Or, FOUL.

I certify that I have personally inspected the said vessel, and that the above statements are correct, and that she leaves this port bound for _____ _____, United States of America, in *quarantine*. [Signature of medical officer.]

I certify that the foregoing statements are made by _____ _____, M.D., who has personally inspected said vessel; that I am satisfied that the said statements are correct; and I do further certify that the said vessel leaves this port bound for _____, in the United States, in _____ *pratique* [or in quarantine].

In witness whereof, I have hereunto set my hand and the seal of office, at the port of _____, this _____ day of _____, 18___, ___ o'clock.

[SEAL.] _____ _____.

[*Consul-General, Consul, Commercial Agent, Sanitary Officer, et al.*]

APPENDIX XIII.

DEATH IN THE STEERAGE. — THE MORTALITY ON BOARD THE "OHIO." — PARENTS PRAYING WHILE THEIR CHILDREN DIED. — COMPLAINTS FROM ANOTHER STEAMSHIP OF THE BREMEN LINE.

The steamship "Ohio," of the Bremen line, arrived on Friday with 1,342 passengers crowded into the steerage. There were 272 children under ten years of age, 156 being infants less than a year old. There was much sickness among them; thirteen died during the passage, and one at Castle Garden after the immigrants landed. All the deaths were sudden, and were not caused by the outbreak of any contagious disease. There were no cabin passengers aboard. Complaints were promptly made to Superintendent Jackson, charging ill ventilation, overcrowding, and bad management generally; and an official communication was received by the Emigration Commissioners yesterday from the German Consulate General to the following effect: —

NEW YORK, April 24, 1880.

GENTLEMEN, — Having been informed, that, among the emigrants who arrived yesterday in this port by the German steamship "Ohio" from Bremen, an extraordinarily large number of children (thirteen, as by enclosed list) died during this voyage, and that some of the passengers made complaint at Castle Garden about the insufficiency of their meals and the way the same were served to them on board the said steamship, I would ask your kindness to cause the complainants' names and addresses to be sent to this office. Hoping that I may be able to ascertain whether the German laws relating to the treatment of emigrants on board of German ships have been violated,

I am, gentlemen, yours very respectfully,

HERMAN A. SCHUMACHER, *Consul-General.*

The following list of deaths was enclosed. It gives the date of death, the names, the disease, and the ages of the deceased children: —

April 8. — Francisca Weyber, diphtheria, two years, two months.
April 10. — Otto Dreher, pneumonia, one year, four months.
April 12. — Fried. Schelawski, pneumonia, seven months.
April 13. — Wilhelm Poschelk, pneumonia, two years, two months.
April 15. — Ernst Herm. Aug. Schutz, diphtheria, six years, three months.
April 17. — Aug. Carlvil Otto, atrophy, four months.
April 19. — Joseph Piotrowski, abdominal catarrh, one year, two months.
April 19. — Anna Bertha Huber, lung catarrh, four months.
April 19. — Fried. Aug. Carl Priebe, pneumonia, seven months.
April 19. — Joseph Carlewinsk, abdominal catarrh, eight months.
April 21. — Fal. Mazurkiwicz, diphtheria, three years, two months.
April 22. — O. A. C. Frank, abdominal catarrh, five months.

Another death of a child occurred yesterday among the passengers just landed from the steamer.

Wilhelmina Pischelke, in an affidavit, deposes that she is a widow, and when she started upon the voyage had her two children with her. Last Monday week her youngest, aged two years, was taken sick in the afternoon, and died the same night. The air was so foul and close she thought that was the cause of the child's death. The ship was so crowded, many passengers had to lie on the floor. The doctor was very attentive to the sick; and there was plenty of food, but no system in its distribution.

Maria Schilafski and Friedrich Patofsky testified that the food was so unequally distributed, that some passengers got too much, while others got too little.

A GENERAL DENIAL.

The Castle Garden Committee of the Emigration Commission yesterday afternoon began an official investigation. Commissioners Ulrich and Pinckney were present. The first witness examined was Capt. Gustave Meyer, the commander of the steamer. He testified that the steamer was specially fitted up to carry steerage passengers; the cabins were removed, and the whole of two decks was converted into a steerage, except amidships, where the officers' quarters were. There was plenty of room for the 1,342 passengers, 1,150 berths having been put up. Some of the families preferred to huddle together and sleep on the floor, so that there were empty berths on the first night out. The ventilation was good, two hatches being kept open. Some of the passengers complained that there was too much air. The rules required the captain to visit the steerage only once a day, but he went three times every day. Over twenty-five per cent more food than the allowance was cooked. There were 500 Poles on board. They behaved very badly, and acted "hoggishly" in scrambling for the food. There were 7,800 pounds of fresh beef aboard when the steamer left Bremen, and it was all used on the voyage. The cause of the deaths among the children was neglect of the doctor's instructions. The children that died were Poles. They died of neglect. Instead of giving medicines, their parents all gathered round and said prayers, while the children were allowed to die. The captain admitted that the arrangements for serving out food were imperfect, and that there was overcrowding of the passengers; but he claimed that it was their own choice.

The purser and the surgeon of the ship testified to the same effect. All agreed in declaring that the Poles were dirty, and neglected the doctor's instructions.

The report of the investigating committee will, it is thought, exonerate the officers of the steamer from direct responsibility for the deaths, but will condemn the overcrowding, and suggest a better system of distributing food.

WHEN SWISS MEETS GERMAN.

Another crowded steamer of the Bremen line arrived at Castle Garden yesterday morning. There were 1,152 immigrants in the steerage; and, as soon as they landed, some of the passengers hastened to prefer complaints against the ship of a similar nature to those charged upon the "Ohio." There had been four sudden deaths among children on the voyage from the same alleged causes, — overcrowding and bad ventilation. The Castle Garden Committee promptly began an investigation into this case also. They took the testimony of three passengers and two of the ship's officers, but will conclude their inquiry on Monday morning. Richard Libere, Michael Meyer, and Leo Schmidt, steerage passengers from Bremen, complained in their affidavits that the officers of the ship did not take care of the passengers; that the Swedish passengers received better treatment than the Germans; that the food was not good, and was badly distributed; that the steward was most of the time under the influence of liquor; that the sexes were not properly separated; that a number of passengers had money stolen from them; and that there was general overcrowding, dirt, and bad management, resulting in sickness and the death of children. The purser and the doctor of the steamer were sworn and examined by the committee. They testified that no complaints were made to them of bad treatment during the voyage. They had four deaths on the voyage, — all

children, of whom there were 222 in all, — and two births. The steamer was not overcrowded, but had twenty-five unoccupied berths. The two officers denied in general all the charges of bad management, and declared that they believed all the troubles among the passengers to have arisen from the fact that two nationalities were crowded together. — *New York Herald*, April 25, 1880.

LIFE IN THE STEERAGE. — THE ILL TREATMENT TO WHICH POOR PASSENGERS ARE OBLIGED TO SUBMIT.

Notwithstanding the fact that the steamship-lines plying between the European ports and New York are declared, upon the highest authority, to make more money on their steerage passengers coming to America, than they do from those who travel in the saloon or first cabin, there have been many well-founded complaints recently brought before the Emigration Commissioners concerning the bad treatment to which immigrants and other steerage passengers are subjected.

The latest cry from the steerage comes from a number of passengers on the Anchor-line steamer "Alsatia," on her latest trip to this port. Owen McManus, an intelligent Scotch mechanic, complains that he was one of a hundred and seventeen others, who were subjected to treatment which he designates as cruel. He has travelled in the steerage of steamers on other lines, on previous visits to this country, and is, therefore, somewhat familiar with the customs of the steerage. He declares, in his written statement, that he and many others were unable to eat the food supplied in the steerage. The salt meat, he alleges, was unfit for human food, being hard, stringy, and tasteless; and fresh meat they were provided with only three times on the voyage. He tasted it once, and found it tainted; and was informed that on the other occasions it was no better. The salt fish was worse than the salt pork, and was thrown overboard untasted by his mess. Oatmeal porridge was supplied every morning for breakfast; but it was black and dirty, and often had black beetles in it. McManus never saw any sugar on the ship. Treacle (molasses) was dealt out instead. What was called butter was furnished, but nobody could eat it. It was so rancid that even the officers of the ship joked about it. The coffee was very poor. For dinner they had pea-soup two or three times, and barley and rice broth on other days. It was always weak and watery. Potatoes were also served every day for dinner. Sometimes they were fit to eat, but generally they were watery; and rotten ones were often cooked with good ones, thereby spoiling them. The only article of food which was good was the "plum-duff," and this they only saw on three occasions. Supper consisted of bread, butter, and tea, the latter being very poor.

The sleeping accommodations, Mr. McManus's complaint alleges, were very dirty. The ship had been used to carry cattle, and was not properly cleaned. The smell was so unbearable, that many men slept all night on deck in the rain. He saw the captain in the steerage but once. A number of passengers made a complaint to him, going to see him in a body; but there was no improvement. The steerage steward (Hamilton) neglected his duty, he says. Two sick women (Mrs. Cook and Mrs. Harris) were confined to their berths for three days; and no one, except the other passengers, went to see them, or took them food. McManus had brought some food on board with him. With this, and by feeing one of the servants, he managed to get some boiled rice every day, and some occasional morsels from the cabin table. In this way he managed to live during the voyage.

Another cause of much complaint was the system of petty thefts which is alleged

to have prevailed. McManus's bed was stolen from him; and he afterward, he claims, recognized it as being offered for sale by one of the petty officers, who made a practice of selling beds to the passengers. He also says that he had a silk umbrella, a package containing clothing, a bottle of whiskey, a pound of tobacco, and other articles stolen from him during the voyage. He heard other passengers complain of similar losses. Another passenger, who accompanied McManus, corroborated his story, and said that, if necessary, further evidence in support of it could be procured. — *New York Herald*, Sept. 23, 1880.

Scandalous Treatment of Emigrants.

The Castle Garden Committee made a report regarding the complaints against the treatment of the steerage passengers on the steamer "Hecla," of the Cunard line. The report finds that the bread furnished the passengers was sour, and that the potatoes were not good; that the berthing was faulty, and, "in consequence thereof, the indiscriminate mingling of the sexes in the sleeping-berths is deserving of censure;" that the conduct of the chief steerage steward was reprehensible, and that he is unfit for his position; "that there was no steerage stewardess on board, and that many female passengers were subjected to insult from the steerage stewards;" and that the ventilation of the steerage was not good. The Committee recommend that a copy of the evidence taken be sent to the Cunard-line company, with a request that the matters complained of be remedied, together with a recommendation that the women passengers be lodged in separate apartments from the men, and that a steerage stewardess be carried on each vessel of the company engaged in immigrant-passenger traffic. The findings of the Committee and their suggestions were concurred in by the Board. — *New York Herald*, Sept. 29.

A Steerage Passenger's Complaints.

In pursuance of his inquiries at Castle Garden, a "Herald" reporter encountered a Mrs. St. Clair, who, accompanied by her six children, was a passenger in the steerage by the "Péreire." This lady, who was met on her arrival by her husband, a resident of Perth Amboy, N.J., complains bitterly of the food and general treatment received by herself and her family. One of the steerage stewards, of whose nationality she cannot speak with certainty, though she thinks he is a German, spoke English, and, shortly after the vessel left Havre, she says, informed her that he should not take the trouble to do any thing for her unless she gave him a fee. Being short of money, she handed him all she could spare, — namely, two shillings; and, from her after experience, the investment would appear to have turned out any thing but profitable.

"The food served out to us," said Mrs. St. Clair, "was insufficient in quantity, and much of it was quite unfit to eat. For three or four days in succession we had salt pork. This was nearly all fat, and, when cut into, was quite black. The bread was sour; and this steward has served out to me five potatoes only, with this filthy pork, as a dinner for my six children and myself. This little one," Mrs. St. Clair continued, placing her hand on the brown tresses of a delicate-looking little maiden of some eleven summers, "was so ill after we had been a few days at sea, that I sent for the doctor. He came; and, from his manner, I presume he did his best: but, as I could not understand French, nor he English, he must have found it somewhat difficult to make a diagnosis of the case. He called this second steward, and, as I afterward understood from a passenger who was present and spoke a little English, ordered him to get some eggs and give me them for the child. I after-

ward found out this inhuman fellow got the eggs, and sold them to one of the passengers.

"My child being unable to eat the food provided, was five days without taking any solid food; and, when I told the fellow that I would complain to the captain, he said, 'Go and complain as fast as you please: he wouldn't understand a word you say.' The doctor also left a bottle of brandy with this steward, to be given to the sick passengers who needed a stimulant; and its contents he sold to them at so much per glass. During the whole of the bad weather, the bed on which my children had to lie was saturated with sea-water." — *New York Herald*, Tuesday, Dec. 7, 1880.

HORRORS OF THE STEERAGE. — GRAVE CHARGES MADE BY PASSENGERS IN THE "SWITZERLAND." — A BOATSWAIN'S BRUTALITY. — SAILORS ILL TREATED, AND ONE MAN WELL-NIGH KILLED.

The steamer "Switzerland," of the Red Star line, sailed from Antwerp on the 20th of November, and arrived at this port yesterday, after a stormy passage of eighteen days, bringing four hundred and thirty steerage passengers, and thirty-two persons in the cabin. Nearly all of the former were German and Swedish immigrants; but a small party of Englishmen, bound to Nebraska, were of the number. In their formal and sworn affidavits yesterday, Edward Marryatt and David Lawton and others of the English party declare that the "Switzerland" was advertised to sail from Hull on the 17th and London on the 18th, and that the tickets they purchased for £4 18*s*. contain that contract. At the last moment, however, they were told that they must go to Antwerp; that the "Switzerland" would not touch at the English ports at all. They were accordingly shipped to Antwerp in two small coasters, and lodged for a night in a filthy hotel, with bedding made of wet shavings and straw. Next morning they were bustled on board the steamer, only ten minutes being allowed for four hundred and thirty passengers to get aboard. Some were very rudely treated, even to the extent of being pushed and kicked. They found the steerage wet and dirty, so that the bedding soon became water-soaked. There was no separation of the sexes whatever; and the accommodations were so scant that several of the passengers could find no bunks, and had to sleep on the deck. Some of the bunks broke down in the first storm. According to the statements of the English-speaking passengers, during the whole long voyage of eighteen days the most disgraceful immorality prevailed.

A PERFECT PANDEMONIUM.

To make matters worse, if that were possible, there were only three lights under steerage at night; and in this semi-darkness a perfect pandemonium prevailed. To use the language of one of the men, "the ship was nothing less than a floating hell." Only two gallons of fresh water were furnished in the morning for four hundred and thirty people to wash with. The officers of the ship, it is alleged, were surly, and sometimes brutal, and laughed at the passengers' complaints, except the second steward, who was more courteous, but could do little for them. David Lawton declares that he was able to get water to drink only twice during the whole voyage. The officers of the ship were mostly Germans; and, when the passengers complained, they pretended not to understand them.

The names of the English passengers who unite in the complaints, as briefly given above, are, Edward Marryatt, David Lawton, Alfred Morrison, Thomas White, James Alexander, and George Septumus Kirkham.

The complaint of the German steerage passengers contains the names of no less than one hundred and thirty-six persons; but the spokesmen of the party, in the formal complaints and affidavits laid before the Emigration Commissioners, were Herman George Koenig, Alfred Haecklaender, and George Reinhard. Their statements were of the same tenor as those of their English-speaking fellow-passengers. One of them said that he had crossed the ocean several times in the steerage of different vessels, but had never seen such immorality, ill treatment, and filth, as in the "Switzerland." The steerage was always wet and dirty, and their bedding was never dry.

ILL-TREATED TARS.

But the passengers, it is said, were not the only sufferers. The sailors, so it is alleged, were the victims of the brutality of one of the petty officers, — an Irishman, either the boatswain or the boatswain's mate, — who beat and abused them shamefully. On the second day out, it is charged he seized an iron bar, and crushed in the head of a sailor, whose name the passengers did not learn. The man fell, and lay as though dead; and after about a half-hour was carried below, and never seen again by the passengers or the crew. Some of the former are of the opinion that he was killed, and that his body was thrown overboard. In seeking for further evidence of this alleged murder, a "Herald" reporter found two of the sailors of the "Switzerland," named Frederick Heintz and Olaf Oelsen, who confirmed the passengers' story of the brutality of the boatswain. They did not know whether or not their messmate was dead. If he was not, they said, he is still in the ship's hospital in a critical condition. The unlucky sailor had done nothing, it was alleged, except to tell the officer that if he struck him, as he had threatened to do, he would have to defend himself. Thereupon, the story runs, the boatswain seized an iron bar, and broke the man's skull. The boatswain's name was unknown to the two sailors with whom the reporter talked. It was their first cruise in the "Switzerland," and they had not heard his name.

The Castle Garden Committee of the Commissioners of Emigration will investigate the passengers' complaints to-day.

A cabin passenger on the "Switzerland," a gentleman of intelligence and observation, whose sympathy was aroused in behalf of the unfortunate steerage passengers and for the crew, made a statement to the reporter, which strongly confirmed the sad story told by the immigrants who complained at Castle Garden. The gentleman in question is an old traveller; but he said he never saw any thing so shameful as the management of matters on board the "Switzerland," especially in the steerage, where people were crowded together like hogs in a pen. "Such dirt, immorality, and foul smells," he said, "are beyond belief. It was enough to breed a pestilence, and would have done so, had it not been that the weather was so cold. The steerage was always wet and unhealthy, and I don't believe it was cleaned or disinfected during the whole voyage. There was a great deal of sickness on board, undoubtedly caused by the dirt. No pure water was to be had. The arrangements for the second-class passengers were very imperfect, — in fact, shamefully bad. Even the commonest articles of necessity were not to be had. When complaint was made to the captain in regard to the ill treatment and sufferings of the steerage passengers, he expressed his regret, and said that he would remedy the abuses if he could, but that it was not in his power to be in every part of the ship at once."

A BRUTAL BOATSWAIN.

"The man who was nearly murdered," the reporter's informant went on, "was an American, I believe. It was reported that he had drawn a knife on the boatswain's mate, and was knocked down with a piece of iron. I don't know the name of the boatswain, or that of his mate; but the former was a Scotchman, and I heard him called 'Tom.' It was an every-day matter for him to kick and beat the men. There was a little half-clad Italian boy, who tried to pick up a living on board by blacking boots, and whose box and brushes were his capital to start in life in the New World. This boatswain, one day, as a piece of fun, upset the boy's box, and kicked it to pieces with his heavy boot. The poor lad cried continually during the rest of the voyage. Another day the boatswain ordered an old Belgian sailor to do something; and, because the old man did not run, he kicked him from one side of the ship to the other. This was so brutal a thing that it nearly caused a mutiny. Another time I saw him approach a man who was tarring a donkey-engine, and smear the fellow's face with the stuff, almost suffocating him by pushing the brush into his mouth. He refused to allow the poor man to wash off the disgusting, suffocating stuff all day. He played the same cruel joke on a man who was painting a boat, — a poor stowaway, with scarcely any clothing. He made the man swallow some of the paint, which nearly strangled him.

"But the most cruel of all his deeds that I saw was his treatment of two Italian stowaways who were found concealed in the hold. He ordered them to go below to the coal-hole; but, as they could not speak English, they probably did not understand him. Thereupon he ordered them to be brought out on deck, stripped naked, and made them stand for hours exposed to the biting wind."

Another gentleman who travelled in the cabin of the "Switzerland" said, "The matter ought certainly to be brought to public notice; and that is, the gross brutality to which the crew were systematically subjected by the men who were immediately in charge of them. The deck was daily and almost hourly the scene of savage and cowardly assaults upon helpless seamen, whose only fault appeared to be, that, being for the most part foreigners shipped from Antwerp, they did not readily understand the orders, which were bellowed out to them amid a storm of curses. Sometimes they misapprehended their instructions, or did not carry them out with sufficient alacrity to satisfy the man who was placed in charge of them; and it was no uncommon spectacle to see men kicked from end to end of the deck."

AN OFFICER'S EXPLANATION.

Second Officer Mills said, "Being a junior officer, I do not wish to take on myself the responsibility of answering for the captain or other officers, who are all on shore. As to the alleged case of brutality in connection with the beating of the seaman, George Hill: I was on the bridge at the time it occurred, and only have a hearsay account of the matter. We had shipped a crew pretty well under the influence of liquor, and who were constantly quarrelling among themselves for the first twenty-four hours. As far as disobedience or obedience of orders was concerned, it was six of one and a half-dozen of the other. They were ugly with drink. About eight hours after we had started, and when off the mouth of the Scheldt, a difficulty occurred forward. During the *mêlée*, in which several of the men were engaged, Hill drew a knife; but, before he could use it, he was knocked down, and quite severely cut about the head. He was taken below, and did not

come out of the ship's hospital during the voyage. I can say that the boatswain is a pretty rough fellow, who has several *aliases;* and I do not know under what name he has made the two voyages he has been on this vessel, as I always addressed him as 'Bosun.' His mate is another sort of man altogether. I have been assured, however, that the boatswain did not strike Hill at all."

The surgeon of the steamer, Dr. A. Weir, said, "Hill was brought down the companion-way to me, and was at once placed in the ship's hospital, where he still remains, though able to walk around the deck. He was beaten soon after we left Flushing, and the injuries to his head (four or five cuts) were so severe that at one time I despaired of his life. He does not know who hurt him, as he was very much intoxicated at the time. He wanted to go to his home in Cherry Street to-day; but I could not permit it: first, because he is not fit to be allowed to travel on the streets alone, weak as he is; and, second, because he shipped at Antwerp, and, under the shipping laws there, we must return him. And, if we gave him leave, he would undoubtedly desert." — *New York Herald*, Dec. 9, 1880.

THE "SWITZERLAND." — ANOTHER SIDE TO THE COMPLAINTS MADE BY STEERAGE PASSENGERS. — INVESTIGATION BY THE COMMISSIONERS OF EMIGRATION.

The Castle Garden Committee of the Commissioners of Emigration yesterday afternoon held an investigation of the sworn complaints preferred by the steerage passengers of the Red Star line steamer "Switzerland," from Antwerp, against the officers of that company, for failing to provide separate sleeping apartments for the sexes, and for other abuses specified in their statements, as published in yesterday's "Herald." Messrs. Hurlbut, Ulrich, Starr, and Pinckney, of the Commissioners, were present; President Hurlbut conducting the examination.

The first witness examined was Herman George Koenig, one of the passengers whose affidavit was given in yesterday's "Herald." His testimony was substantially the same as his affidavit. When other complainants were called for, there were none forthcoming; and it was regarded as very singular, that, out of one hundred and thirty-six persons who signed the original complaint, only one was present to sustain the serious charges at the hearing yesterday. It is no doubt true that many of the immigrants could not afford the time to wait over in New York for the hearing. Three immigrants were present, who testified in direct conflict with the charges made.

Barbara Hochstaedler, a good-looking German woman, deposed that she had crossed the ocean three times in the steerage. She came out in the "Switzerland" to join her husband in the West, and had travelled alone. She said, that, so far as she knew, the sexes were not mingled together, single women not being compelled to sleep in the same compartment with men, and so on. The single men were supposed to sleep down stairs, in the lower steerage, and the unmarried women were put in the upper steerage. A few single women, however, by their own choice slept with their parents in the compartment reserved for married couples. The witness saw no immorality, and heard of none. The water was good, and there was enough of it. She had no complaints to make against the management of the steamer. She had been as well treated as she could expect in the steerage.

William Sharp, a steerage passenger, also deposed, under oath, that he had no complaints to make. He did not see or know of any immorality. The men and women had separate apartments, although there were no signs over the doors to distinguish them; but they need not have occupied the same berths unless they

chose to do so. The steerage was wet and damp at times, but he did not know of any sickness that was caused therefrom. The witness, under further examination, denied the stories of scarcity of water for washing and drinking purposes.

Arthur Christian Day, another steerage passenger, gave testimony to the same effect. He knew nothing of the serious abuses of which one hundred and thirty-six of his fellow-passengers had complained.

CAPT. ANDERSON'S EMPHATIC DENIAL.

John Bruce Anderson, the captain of the ship, was then placed on the witness-stand. He testified emphatically and without hesitation, and denied all the serious charges made by the complainants. He said that he attributed all the complaints to the fact that the voyage was so long, on account of the bad weather. He said that there was plenty of room in the steerage; that separate rooms, with doors, were provided for the sexes; and that there was no compulsory mingling of the two. On the contrary, every thing was done to preserve good morals. He visited the steerage himself once every day during the voyage, and sometimes oftener, and saw that every thing was kept clean and wholesome. The passengers quarrelled and fought among themselves; and, while the Germans sang "Die Wacht am Rhein," the French shouted "La Marseillaise." Sometimes they almost came to blows. The captain declared that the voyage was unusually lengthened and stormy, and that, on this account, there was some discomfort; but he repeated his assertions, that no complaints had been made to him during the voyage. There was no overcrowding, more than enough berths being provided for all. Some of the passengers slept on the deck, but they did so of their own choice. They were Englishmen, and declared that they would not sleep in the lower steerage with the Italians. Witness was of the opinion that the complaints among the passengers had all been fomented by one man, who had induced the passengers to sign the paper complaining of their bad treatment.

Louis C. Martines, chief steerage steward, testified that there were four hundred and thirty-six steerage passengers, and that there were about four hundred and fifty berths. There was no overcrowding, while there was plenty of water and good food. He confirmed the captain's story, — every word of it.

A. H. Weir, the ship's surgeon and purser, was sworn. He declared that there was no serious sickness. He knew of no overcrowding, and no immorality, or of men occupying the women's berths. It was witness's first voyage, and he did not know how the steerage people were usually treated.

Mr. Hennessy, of Peter Wright & Sons, who was present as the representative of the agents of the line, declared that the company invited a full investigation. He denied that there was any foundation for the complaints.

The Committee took the papers, and reserved their decision. — *New York Herald*, Dec. 10, 1880.

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IV.

THE MANAGEMENT OF CONTAGIOUS AND INFECTIOUS DISEASES IN MILWAUKEE.

By O. W. WIGHT, A.M., M.D.
Health Officer, Milwaukee, Wis.

In response to an invitation by the President, I have undertaken to explain, in the briefest way, my method of managing contagious and infectious diseases in the city of Milwaukee.

The city charter empowers the commissioner of health "to forbid and prevent all communication with any house or family infected with any contagious or pestilential disease, except by means of physicians and nurses."

The charter also requires "each and every practising physician in the city of Milwaukee to report in writing to the commissioner of health every patient he shall have laboring under any pestilential, contagious, or infectious disease, within twenty-four hours after he shall ascertain or suspect the nature of such disease."

The charter also enables the commissioner to prescribe the form of such reports, and to issue general orders in regard to various matters pertaining to the public health.

A city ordinance provides, that "it shall be the duty of the commissioner of health to cause a notice, printed or written in large letters, to be placed upon all the outside doors of any house in the city of Milwaukee, in which any person may be affected or sick with small-pox, scarlet fever, or diphtheria, upon which shall be written or printed the name of such disease; and such notice shall remain upon such house until the case shall cease to exist and such house shall have been thoroughly disinfected; and if any person or persons shall deface, alter, mutilate, destroy, or tear down such notice, without permission of the commissioner of health, such person or persons shall be liable for each offence to pay a fine of not less than twenty-five nor more than fifty dollars; and the occupant of any house upon which such notice shall be placed or posted as aforesaid shall be held responsible for the removal of the same; and, if the same shall be removed without the permission of the commissioner of health, such occupant shall be subject to the like fine of not less than twenty-five dollars nor more than fifty dollars, unless he shall notify the commissioner of health within twenty-four hours after the removal of the said notice."

The ordinance further provides, that "when from current rumors, or from any other reason, a suspicion exists" that such diseases prevail in any family

or household, "it shall be the duty of the commissioner of health to ascertain personally whether such is the case," and to enforce the law.

At the beginning of my administration, in the spring of 1878, I issued a circular to all the practitioners in the city, notifying them that the law requiring them to report cases of contagious and infectious diseases within twenty-four hours would be strictly enforced. Half a dozen prompt prosecutions convinced the profession that the health department was in earnest. One quack, unable to give bail, lay in jail till the day of his trial. One haughty and fashionable "doctor" was driven on the witness-stand, under cross-examination, to swear that he had no diploma, and was a mere pretender.

Physicians in the city are gratuitously furnished with postal cards, on the backs of which is a blank to be filled, showing the name of the patient in full, sex, nationality of parents, patient's birthplace, number and street, ward, age, married or single, disease, and date. It requires but a brief time to fill out this blank at the bedside. The postal card can then be dropped into the first letter-box which the physician passes after leaving the house, and it is sure to reach the health officer within a few hours.

The following is the form of this blank : —

REPORT OF SICK CASES.

Name of Patient in Full.	Sex.	Parents' Nationality.	Patient's Birthplace.
1.			
2.			
3.			

No. and Street.	Ward.	Age.	Single or Married.	Disease.
1.				
2.				
3.				

Dated, ... 1880.

Maximum penalty for neglect to make daily report to the Commissioner of Health, $250.

When the card reaches the health office, the commissioner writes upon its margin the name of the assistant medical officer of health in whose district the case may be located, and at the same time fills out and signs the following order : —

No.

HEALTH DEPARTMENT OF THE CITY OF MILWAUKEE,
Milwaukee, , 188 .

To .....M.D., *Assistant Medical Officer of Health.*

It having been reported to this office that there is infectious disease, to wit, ..., in the house known as No..... street, ... ward, you will proceed without delay to placard said house according to the requirements of law, and at the same time to leave with the attendants the proper circular issued from this office for the sanitary management of said disease; to ascertain the number of persons exposed, and the amount of exposure; to make diligent inquiry as to the contagious or other origin of the disease at that place; to make a careful personal examination of the sanitary condition of the premises and surroundings, and to make a written report to the commissioner of health on all the points above indicated, with such other suggestions as you may think advisable. The examiner will not, by word, look, or act, interfere with the practice of the attending physician.

.....M.D., *Commissioner of Health.*

The card and the order are passed to the secretary for registration and indexing. Twice daily the assistant medical officers report to the commissioner for duty, when they receive these cards and orders, and hasten to placard houses as directed.

The placard is eleven by fourteen inches in size. The small-pox placard is printed in large black letters on a bright-yellow ground; the scarlet fever on a red, and the diphtheria on a lead-colored, ground. On the top of the placard is the name of the disease in the largest possible letters, under which is the following warning: "$25 to $50 fine for removing this notice without authority from the commissioner of health. If removed, occupant of house must report to health office within twenty-four hours, under the same penalty." On the lower half of the placard the same thing is repeated in German, as about one-half the population are of that nationality.

At the time of placarding the house, the assistant medical officer makes a sanitary inspection of the premises, and reports in writing. His report, the order and the card, already mentioned, are pinned together, and placed on the desk of the health commissioner for examination and approval. Such reports not infrequently give rise to additional orders to occupants or owners of the premises to clean vaults, fill up or drain low grounds, remove manure-heaps or other filth, to empty and cleanse foul cisterns, to close up polluted wells, to overhaul defective plumbing, to make connections with the public sewer for the purpose of safely removing slops, wash-water, and other liquids, etc., all of which pertains to another branch of the administrative sanitary work of the department. These reports of the assistant medical officers are numbered, indexed, and filed away by the secretary for future reference. In time they will accumulate sufficiently to form the basis of some important statistical generalizations.

As often as reports of contagious cases come in from the city practitioners,

notice thereof is immediately sent by means of postal-card blanks to the public and private schools in that neighborhood, the teachers of which are under orders not to admit pupils from infected houses under penalty of prompt prosecution in the criminal court. The same notice is also sent to the public library.

When a case of contagious disease recovers, the attending physician usually sends notice to the health office, although he is not obliged by law to do so. If he neglects to perform this service, the family is sure to give him a sinister blessing; for the placard then remains on the door for a month, when it is looked after by the health department. Some of the doctors, to please their patrons, have reported recovery suspiciously early; in which case a visitation is made by the health commissioner, or one of his medical assistants, and, if suspicion is verified, a severe rebuke is administered to the practitioner who dares to trifle with the public safety. Burke, who murdered his fellow-creatures in order to sell their bodies for dissection, was a Christian and a gentleman in comparison with the medical fiend who connives at the spread of contagious disease in order to increase his practice.

When a case of infectious disease terminates by recovery or death, a trained person is sent from the health office to disinfect the house and take down the placard. Disinfecting is done by the approved process of burning sulphur in the rooms, closed as tightly as possible. A reliable and careful man is employed for that special purpose.

Public funerals are strictly prohibited in cases of death by contagious diseases. All the undertakers and clergymen in the city are under stringent orders to this end. Two or three threats of arrest were sufficient to enforce the orders. Funerals, in such cases, are now quietly conducted at the homes of the deceased, and no young person is allowed to act as pall-bearer. The transition is very great in a city where, four years ago, small-pox funerals were held in churches. The enlightened majority of the clergy are entitled to credit for efficient aid in this part of the sanitary work.

Railroad officials, expressmen, public carriers, and all other persons are forbidden to bring to Milwaukee any person laboring under an infectious disease, or the remains of any persons having died of such a disease. There have been only two violations of this regulation in as many years. In one case a man brought clandestinely at night the remains of his child, deceased with scarlet fever, from a neighboring city. The imperative necessity of getting a burial permit from the health office compelled the undertaker to reveal his employer, and the man fled from the cemetery to escape the sheriff. In the other case, a railroad train from Chicago was arrested at the city limits, and a whole funeral *cortége* put off and ordered to take a suburban road to the extra-mural place of burial. These examples have been enough, and nobody seems desirous of repeating the experiment.

The circulars left with families by the assistant medical officers, at the time of placarding their houses, give pretty full directions for the hygienic management of the different infectious diseases. These circulars have been compiled

from the best sources. For example, that concerning scarlet fever is in great part a copy of the excellent circular issued by the Massachusetts State Board of Health. In this way useful information concerning infectious diseases is diffused among the people. A family afflicted with a contagious malady is generally in a mood to receive such information and profit by it.

In dealing with small-pox, vaccination of all exposed persons is added to the procedure already described. In fact, there has not been a case of small-pox in Milwaukee since two years ago last July. When I took charge of the health office of the city, in the spring of 1878, I found small-pox in half a dozen different localities. It seemed determined to linger, till I made use of the extraordinary power conferred on the department by the Legislature of the State in the municipal charter, "to forbid and prevent all communication with any house or family infected with any contagious or pestilential diseases, except by means of physicians and nurses." By such a rigid system of domiciliary quarantine the foul disease was "stamped out," and has not returned.

The advantages of the system may be briefly stated: —

1. It enables the health department, and the public through the health department, to know, every day in the year, the exact number of cases of infectious diseases in the city, and their precise location. Rumor and sensational exaggeration in regard to the prevalence of contagious maladies, which are liable to alarm the people needlessly, and to interfere with the pursuits of life, can then be corrected by facts. And the truth of a violent epidemic cannot be suppressed in the interest of commerce to the criminal endangering of the outside world.

2. The exact percentage of mortality is constantly known, revealing the severity or mildness of an epidemic.

3. The system affords especial means of studying the conditions under which contagious diseases flourish, or to what extent they are influenced by sanitary surroundings.

4. It diminishes the spread of contagious diseases by protecting large congregations of children in schools from the presence of those bearing infection in their persons or clothes; by preventing exposure of the living at public funerals; by revealing, to all who can see and read, the places where such diseases may be caught; and by destroying the lingering germs of contagion in sick rooms by means of thorough disinfection. My experience convinces me that a community will give a wide berth to small-pox, scarlet fever, or diphtheria, if you will only let them know where it is. I have frequently seen quite small children cross over to the other side of the street when approaching a house on the door of which was placed a placard revealing the existence of contagious disease within. It is wicked to conceal from God's little ones the fountains of infectious suffering and death.

The difficulties of carrying out the system are considerable, but not insuperable.

1. While the majority of educated physicians are ready to co-operate with the health authority in carrying out any reasonable system of protecting the

public from contagious diseases, the negligence of many and the perversity of a few must be overcome by the unflinching execution of law. To the credit of the profession in Milwaukee, it must be said that no one has raised the question of fees for reporting contagious diseases to the health office. An unseemly discussion of that question is now going on in Great Britain. The medical practitioner depends upon the patronage of the public, and should be willing to do for the public at large a service that costs very little time and trouble, and is attended with no expense. It is a fortunate feature of the law, that it requires the attending physician to report a contagious disease as soon as it is suspected. For that reason the public receives the benefit of a doubt. The necessity of reporting to the health office all deaths, with the causes, in order to get a permit to bury, puts the doctor on his good behavior. A few attempts to return croup for diphtheria, spotted fever for scarlatina, etc., have been met with an order for a coroner's inquest. Inability to make a diagnosis has sometimes been urged as an excuse by delinquent quacks; but one or two criminal trials soon revealed to them that the responsibilities of assumed knowledge cannot be avoided by a plea of ignorance. In some instances doctors have prematurely reported recovery. The law of duration in contagious diseases is too well known to allow such heedlessness to escape notice and rebuke. It is sometimes disagreeable to supplement the mental and moral defects of a portion of the profession by the terror of criminal law, but faithful sanitary administration requires it.

2. At first the people objected to having their houses placarded, as a violation of personal liberty. A little argument convinced reasonable citizens that no man has the natural or acquired right to expose his neighbors to deadly contagious disease by concealing it in his own house. Personal liberty to give small-pox to somebody else had better be abridged as soon as possible. Personal liberty to send scarlet fever into a school with your child is rather diabolical than beneficent. Personal liberty to infect a church with a diphtheria corpse is tempting Providence to start an epidemic. But many were beyond the reach of argument. A fortunate accident of legislation solved the problem. The alternative was placed before them of quietly submitting to the placarding process, as provided by city ordinance, or of being subjected to absolute quarantine in their houses, as provided in the charter. A law-abiding community submitted; and to-day the system of placarding, if it were left to an election, would receive an overwhelming majority of votes in its favor. Experience proves its value in many ways to the citizen. He knows and feels, that, by reason of it, his family is more secure against diseases that cost money, anxiety, and sorrow.

The defects of the system are already apparent to educated sanitarians.

1. So far as small-pox is concerned, proper vaccination and revaccination at suitable ages should be universal and compulsory. I am sorry to say, that, in this respect, the sanitary code of Milwaukee is defective. Without vaccination, suppression of the disease allows the greater accumulation of material for the conflagration of an epidemic, that, sooner or later, may get under way

and defy all control. Every escape from scarlet fever is a positive gain; for susceptibility to the disease decreases with age. Diphtheria should be suppressed all the time; for one attack does not secure immunity in the future.

2. The efficiency of the system depends to a great extent on the willing or enforced co-operation of the medical profession. Just so far as the profession falls short of an ideal standard must the system fail to reach its ideal value, however well it may be administered.

The system in Milwaukee is supplemented, as it should be, by a pest-house, to which the sick with contagious diseases, who have no homes, can be taken. With an efficient system of placarding and isolation, it is more economic, more humane, if not safer, to leave patients who have homes under the care of their families and friends. However excellent a hospital and its service may be, households are unwilling to give up any of their sick members to be nursed by unknown hands in a strange place. To force away children from parents, from brothers and sisters, and parents from children and from one another, for the purpose of isolating infectious disease, exposes the public by transportation of the afflicted, diminishes the chances of recovery, outrages the unreasoning affections, and invades the sanctity of home. Sanitation must reckon with the unalterable instincts of humanity, and restrain itself within the boundaries of reasonable endeavor.

Therefore, in my judgment, the isolation of contagious and infectious diseases in the family, which is the unit of our political society and Christian civilization, is wisest and best. After long, administrative training, we shall get the willing co-operation of households and their chosen physicians. The day will come when exposure of others to our diseases will be recognized as a crime, the punishment of which will be demanded by the public conscience.

In the meantime we must combat superstition, diffuse rational knowledge, and protect the people against pestilence by the simplest and most effective means at our command, winning confidence by patient, kindly instruction, only using repression and the lash of law when we must.

V.

OUR PRESENT AND OUR NEEDED KNOWLEDGE OF EPIDEMICS.

By Dr. EZRA M. HUNT,
Secretary State Board of Health, New Jersey.

The importance of the study of epidemics has greatly increased, and meets with larger encouragement under the light of modern science, and by the aid of numerical methods and inductive processes of investigation. Enough is now known to satisfy the medical physicist that these laws are discernible, although for very many reasons difficult of discovery. After we have become satisfied that these have their laws as exact and prevalent as are those which govern in the other departments of physical science, it will not do to be deterred from effort by the intricacy of the study.

It is more and more evident that we are to study the natural history of epidemics very much as we study phenomena in the world about us. Both disease and remedy are to be found in that close observation, record, and classified analysis of facts which marks the difference between mere speculative knowledge and that science which is sure to end in art. The first step toward finding a remedy is to find the disease, with that thorough accuracy of diagnosis which not only names it correctly, but outlines it in all its forms and with all its variations. Having done this much we naturally seek for the cause, not merely with inquisitiveness, but as a part of the guide to treatment. We often for a long time fail in this seeking. But meanwhile not only our science but our art makes progress; for in this seeking we come to know very many of the media through which the cause operates. Knowing the circumstances upon which the operation of the cause or the extension into epidemic proportions is conditioned, we learn to interrupt the co-ordination and co-operation of mediate and intermediate essentials before we know the cause, and thus limit, embarrass, or prevent the disease.

The word "epidemic" means "upon the people," or that which prevails among the people, and in that sense might be alike applicable to pthisis or small-pox, as both may largely prevail from causes which are preventable. Yet the term has usually been applied to a class of diseases somewhat more restricted.

Southwood Smith, as reported in the summary given by Baker on the "Common Nature of Epidemics," elaborates the following points: —

1. Epidemics resemble each other in being all fevers.
2. In the extent of their range.

3. In the rapidity of their course.

4. In giving distinct or unmistakable warnings of their approach.

5. In being actually present and in operation some time before they assume their distinct and proper form.

6. In the uniformity of their course.

7. In the manner of their migration.

8. In the periodicity of their return.

9. In the brevity of the space that intervenes between attack and death.

10. In being produced by the same causes.

He ably illustrates all these points; but exception could now be taken to one or two of them, although most of them are still food for thought. Points four and five especially need more study.

It was a gain when nosology attempted to be more definite, and restricted the appellation to the class or some of the class of diseases which it termed zymotic. It is true the name, as meaning "a ferment," may indicate too much the *modus operandi* of the assumed exciting cause; but still we may use it as indicative of a class, without necessarily clinging to the etymology of the term. Under this head we have the term "miasmatic," which, as meaning defilement, or, as in its noun, denoting a noxious exhalation or particle floating in the air, very nearly describes what is now conceived to be one, if not the only, exciting cause of epidemics. The order miasmatic fairly includes the diseases associated with households and animal conditions, and the class of periodic fevers generally spoken of as malarial.

While we must not seek for refinements in classification which are artificial, yet, as a guide to study, we think we must still cling to the distinctions between animal and vegetable decays, between the *débris* of vegetables and the excretions of animals. So while filth is the general term, and while its presence in some form or other is recognized as the medium or correlative to the originating cause, we need to study what are the types of disease which each kind of filth favors, and whether these may co-operate and coalesce, as in typho-malarial fevers.

This includes air or water or food fouled by various methods, and in its broad sense would include all that decomposition which is, in a sense, so abnormal as not to find nature ready to utilize it in ways or quantities not inimical to healthful existence. In all decompositions we need to have in mind that which is normal or natural, and that which is forced or artificial; to look also on fermentation and putrefaction as distinct, although allied, processes; and to study the effects of complicated or interrupted decay. Just as in the human organism there is destructive assimilation and a constructive metamorphosis which is normal and tends to life, and another kind which is a destructive and disruptive metamorphosis which tends to individual death both in its incidents and products, so we have decompositions which either within the individual, or in the nature without and around him, may result in that perverted miasm which is so productive of epidemicity.

The usual decay and reparation going on in every one of us is not a process

of disease; but abnormal decay is. Plants, like animals, have their unhealthy conditions, or abnormal processes of decay. The sicknesses of plants as well as of animals may give rise to morbid processes which affect human life. In addition, it is probable that the sudden arrest of growth in plants, without careful drying, causes abnormal and unhealthy decomposition, which would not occur in the natural decay of the same vegetation by normal processes.

The whole subject of degraded or interrupted fermentations of very different results and from allied processes, the incidents (pythogenic) which attend certain deranged and vicious disintegrations of nitrogeneous compounds, and the laws which determine between the restorative and the putrefactive, — all come in review in such a study.

It will not be wonderful if the conditions which determine whether a cess-pool shall be merely a common foulness, or whether it shall have a specificity productive of typhoid, shall yet be ascertained, and so as to vary many of the developments of specific diseases and of epidemics.

In the interruptions which are constantly taking place, both in the inner and the outer world, it is not surprising that natural decomposition and exchange are interfered with, both in quality and quantity, and thus artificial and virulent productions should result. When these become so intensely complicated, as they often do in the interruption of nature's methods which we make in the processes of art, and especially in the complicated conditions of household, civic, and personal management, and in the great upheavals of modern construction, it is not surprising that we give rise to a series of morbific agencies which so prevail among the people as to be called "epidemic."

As the kind and degree of obstruction of normal and healthful disintegration, and the interferences with its healthful appropriation by its natural consumers or purveyors, are well-nigh numberless, it is not surprising that the kinds of combinations produced are various; and this means, also, kinds of disease. As new artificialities are multiplying, new interferences and combinations occur. It is not wonderful that new results should be obtained, and that these should be manifested in correspondingly new diseases or new types of old diseases. (See Coleman, 1866.) It seems to us no more strange that a new disease should arise, even long after some of its factors were in existence, than it is that gun-cotton or nitro-glycerine should have had their fortuitous combination so long after their elements had existed and been in use in the laboratory. Great causes of things sometimes exist in close proximity without (as we may temporarily say) happening to come together so as to produce results.

I cannot quite tell why, in India, the "nitrogen derived from the previous contamination of the soil with decaying animal matter, so stores itself and rests as to find its result in factories in the large cities for manufacturing saltpetre therefrom, while, in a certain year at a certain spot, the manufacture was cholera." (See "Sanitarian Record," Aug. 15, 1880.)

So, in nature, there may be chemical combinations or new biological conditions, of which new epidemics will be the declaration. It is important that

we form a correct estimate of what progress we have made in these morbific influences, in order that, by stating with precision just what we do know and what we do not know and most need to know, as also the most hopeful lines of inquiry suggested by past experience, we may have accurate reckoning, both as to the science and the art of epidemiology.

The first and most important statement in this department of modern science needs to be restated and constantly kept prominent. It is, that we are to draw distinction between those "common chemical" decompositions by which, as one expresses it, "inorganic chemistry becomes superior to organic chemistry" (Colman), and in which, as a rule, gaseous products are produced perceptible to the senses, and the view advanced by Professor Cheaveau and indorsed by Sanderson, Simon, Russell, and Klein, that the infecting agent or contagion consists of particles of extreme minuteness, with respect to which it can be asserted that the material they are composed of is *not* soluble in animal liquid, that it is not volatile at ordinary temperatures, and that it possesses a specific gravity very slightly different from that of the liquid in which the particles are suspended." This enables us to say, more positively than we can say any thing else as to "morbific contagium," that it is particulate, that it is not to be measured by odor, and that its presence or its removal is not to be inferred by the mere removal of a stench.

This does not decide the question whether common chemical poisons, by their co-presence, their intensity, or by their interference with normal vitality, may not notify us, and may not somewhat modify the effect of what we may call the specific factor in contagion, or produce their own uncontagious irritations or diseases: but it does enable us with hopefulness to select for more exact study these particles, their origin, their chemical attributes and laws of diffusion, their habitats, their mode of entrance, their sedation, their mode of action, their selective affinities for tissues, parts or organs or persons, — in fact, their whole history, and *modus operandi* as constituting disease; then, too, to study them in their extension in the individual, and in their impartations from him or from processes connected with him to others.

It does not decide the question whether this particle is bioplasm or an unvitalized cell, whether it is vegetable or animal, but gives a very hopeful start for studies in the direction of determining these points.

It does not decide the question whether the fungoid or parasitic plant, such as the *oidium albicans* found in thrush, or the animal parasites (microphytes) in the lymphatics in diphtheria, are the exciting causes or constitute the disease, or whether, *by multiplying* and *feeding* or *by mechanical obstruction*, they are the critical factors in the disease, but puts us *en route* for such inquiries: all the more, since, as in diphtheria for instance, we so early find the lymphatics (beginning with those about the fauces) filled with granular matter, which Nassiloff finds to be mostly micrococci, and so considers himself justified in regarding the changes which occur in the mucous membrane in faucal diphtheria as probably dependent on the occupation of the channels of absorption by these masses.

Still more definite is the discovery of a specific organism (*bacillus anthricis*, 1850) in the bodies of animals dying of anthrax, and as repeatedly confirmed since in men. It exists in *spores*, and, when fully developed, in *rods;* the former being persistent of vitality for an indefinite period if kept free from moisture, the latter being very ephemeral.

Further, we are able to identify two varieties, the external and the internal, accordingly as the contagium is deposited upon the skin, or is received by injection or by inhalation into the air-passages. Carl Lemke of Göttingen, in his experiments (1879), caused the disease by the direct introduction of the spores into the blood through the air-passages.

Professor Toussaint, of the Veterinary College of Toulouse, was able to graduate the severity of the disease by the quantity inhaled, and could determine by the mode of introduction the lesion occasioned. So in infectious pleuro-pneumonia, by inoculation, the great lung-lesion is avoided by a milder local effect. The spores introduced for anthrax begin in a rapid multiplication, consuming the oxygen of the blood; the millions of minor organisms depriving the one human organism of its vital air, and at the same time so increasing as to cause mechanical obstruction of the blood-paths and of the lymphatics.

In a similar line of direction are the facts as to spirilla in relapsing fever (Obermier of Berlin, Richardson, etc.), and the relation of the relapse to development and clogging.

The studies of Dr. Drysdale and Rev. W. H. Dollinger, as to the thermal death-point of known monad germs, the differences depending on the stage of development (see "Ind.," June 3, 1880), give light in the same direction.

Also the observations of Dr. Kock of Wollstein, Professors Toussaint, Pasteur, Greenfield, and Buckner, of Munich, some of whose observations were summarized by Professor Lister at the August meeting of the British Medical Association.

Again we may say, all such facts do not decide the question whether a disease process allied to ferments is set up, and thus, besides appropriation of the pabulum of the human organism and mechanical obstructions, there also results a fermentive or putrefactive process, destructive of life.

Such close observers and such unimaginative pathologists as Klebs and Billroth use the term "*microsporon septicum*," and "*cocco bacteria septica;*" and Dolschenkow identifies the development with the putrefactive process, and recognizes their power of colonizing as instituting a specific disintegration. Simon and his co-workers speak of these infective particles as ferments capable of setting up diseased processes of septic transformation, in which these forms of vegetable or animal life swarm.

The fact that Toussaint succeeded in inoculating with the fluid in which the *bacillus anthrax* had grown, when the *bacillus* itself was excluded, is significant.

As an illustration in comparative pathology, Professor T. J. Burrill, in a recent paper at our American Scientific Association, on the anthrax of fruit-

trees, shows that "the immediate cause of the disease is a living organism, which produces butyric fermentation of the material stored in the cells, especially those of the liber." In other words, he does not assume the "particulate" to be the actual ferment, but as the occasion of the butyric fermentation in the liber-cells.

Even some natural ferments, as pepsin, have less aptitude for putrefaction than others. (Dalton.)

In view of the references already made, and of some recent investigations into diphtheria (see Wood and Formad), it becomes a question whether the "*monerma*," or lowest kinds of monads, or the lowest plants, — such as *bacteria* or *baccilli* (see Dollinger, "Ind.," June 3, 1880), — may not merely act in a catalytic or fermentive way in the blood, "as the yeast-plant acts upon sugar, and causes the production of a septic poison" of a specific character. (See "Medical Record," Oct. 30, 1880.) Professor Brewer uses the term "septic ferment organism," p. 68.

Every kind of fermentation is probably correlative with the growth and multiplication of animal or vegetable organisms. One cannot study the common fermentations of chemistry as that of the yeast-plant, or the laws which determine the kind, such as between the acetic and vinous, or even the various alcohols, or the conditions under which a normal fermentation glides into a putrefactive one, without, in view of present facts, holding prominent the hypothesis that the various contagious, and perchance some other, diseases, depend on various fermentive processes caused by different materials; results being modified by the kind and condition of matter, by states of atmosphere and temperature, and by the condition of the individuals in whom the process is attempted to be set up. As an illustration, the question whether from cider you shall have a mould or spoiling, or an alcoholic or an acetic fermentation, is a question of temperature. (See Colman, "Alcohol and Hygiene," p. 198.)

Again, this inquiry does not decide, either, whether the "infective particle" is always from without, or whether its efficiency may not depend much upon the state of the individual. We are getting some help, not only from comparative studies in animal, but also in vegetable physiology and pathology. It may perhaps be said that "the origin of many of the parasitic fungi concerned in blights of various descriptions have been shown to arise, not from the accidental deposition of germs or spores floating in the atmosphere, but from the morbid transformation of the centres of living matter in the tissue attacked. In other words, the starting-point of the disease is internal, not external, — a true tissue degeneration caused by defective nutrition from overcrowding, as the phylloxera in the grape-vine, undue moisture, badly conditioned soil, or any one of the many physical causes which may operate to produce degeneration." (See summary in "Times," Nov. 4, 1880.)

The view taken by Fleming as to the occasional spontaneous generation of hydrophobia, what we know of the individual origin of the dissecting-room, septic, etc., lead us to suspect that the origin of spores, or of the particulate or septic, whatever it may be, is not always external. When so, it cannot

always in perfectly healthy persons, or in those who have had preparatory prophylaxis, find the conditions for starting disease. And it is a matter for close inquiry whether the juices or fluids of the system may not be prevented from being culture fluids.

The fact that such inquiries are fully authenticated as in order, is one of the most encouraging advances in our investigation of epidemics and of all diseases.

With so much as is known as to the particular character of contagions, and some outlines as to their modes of introduction and extension, our business is just the same as that of other sciences to determine the phenomena of action. Accepting, then, as a working theory, that the infective particles of communicable diseases are identified with organisms, either animal or vegetable, either within or without, the inquiries that cluster about us are these : —

Is the presence of organisms confined to these communicable diseases?

The answer to this must certainly be in the negative. Beale well illustrates this in what he says of fungi and low organisms found in the mouth. (See "Slight Ailments," pp. 29–31, Beale.) "If you look at the old cells detached from the mucous membrane of the mouth . . . you will find that these cells contain a number of very minute spherical or oval particles, and multitudes of very delicate filaments. Now, these minute spherical and oval particles, situated in the formed material of the cell and most numerous at its outer, that is, at its oldest, part, are fungi in an early phase of development. They have been called micrococci, and have received other names. In this state they have not reached their full development. They are the growing germs — beginnings — of organisms which exhibit different characters in their fully developed state, and each is capable of providing millions of descendants in a few hours. Some of them probably, under certain circumstances, become elongated, and evolve *bacteria* of various forms; others may form the long threads which used to be called '*leptothrix buccalis*.' Some, perhaps, may be the germs of *oidium albicans* and other fungi. It is probable, indeed, that many different species of fungi may be developed from the spherical or oval germ particles. . . . The germ particles themselves, although they resemble one another in appearance, may have been derived from different species. The germs grow and multiply under different circumstances." (Beale, S. A., p. 31.)

This at once compels us not to make the fact of animal or vegetable organisms either the proof of a disease, or as any peculiar concomitant thereof. The identification consists in finding some specificity in the character of the microzymes which are found in this or that disease.

The questions are, therefore, still in order whether our infective particle is organic matter in a state of ferment or putrefactive decomposition, its infection being not dependent upon the microzymes it contains, or whether the kind of microzymes it contains defines its specificity, or whether they are the cause or the result of the diseased conditions.

Hence, the more advanced study now is, whether the contagion resides in

the microzymes, or is coincident with them, or depends very much on material found in the individual; whether each has its specific order of low organisms different from the harmless kinds, or evolved by disease changes; or whether these having been produced, even if not the original infection, they may not by their appropriation of oxygen, or by their feeding or clogging, constitute the gravity of disease. This infiltration of the living tissue has been termed by Sanderson "mycosis."

Our increasing knowledge of animal and vegetable parasites, and of the degree to which tissues may become inhabited by the lower forms of life, and of the symptoms which their presence, or, still more, their stages of existence, may cause, leads to more than a conjecture that these lower forms, by their infinitesimal multiplication in certain localities of the body and their voracious feeding, come to take possession and finally to supersede the higher life which they have invaded. Thus the higher in quality succumbs to the greater in quantity, and the human life ceases to be. It is also claimed that the danger is especially imminent just at the period when some of these forms may be in their changing or incubative state. If only we can carry the body and the life through this stage, it will survive, since most of these lower forms in their passage through their stages of life quickly perish by a law of self-limitation.

We purposely assemble all these different items, each weighty and distinct in itself, in order to show, that, when we have announced a germ theory of disease, we have still many things to settle about it before we have made much advance in our definitions of infective germinal matter.

We think advance has been made in facts already alluded to, many of which have come to record only the last year or two.

These point to ferments or decomposing changes, which have their kinds of inhabitating and multiplying life just as truly as the decomposition of the cheese has its mite, distinct from that of stale rain-water. It leads us to study the laws of fermentation and putrefaction in all decomposing matter and in its variety of exposures, and also to separate the microzymes of diseases as we separate between diseases themselves.

In respect to most, if not all, the particles which give rise to epidemics, it may be said that they are chiefly, if not entirely, dependent for their fertility and extended spread on the presence of filth. They are either formed or incubated chiefly, if not entirely, amid the putrefactive decompositions of vegetable or animal matter.

We are able to associate some of them, as the malaria of intermittent fevers, with preponderance of disturbed vegetable decompositions, while typhus fever is more allied as to ætiology with the putrefactive or pythogenic decompositions of animal matter or excretions.

It is not surprising that between these we should find numberless productions still undefined and undefinable, just as chemistry, with all its knowledge of hydro-carbons, is not yet ready to separate several of the unstable and as yet indescribable compounds found in the sludge of petroleum.

Air, humidity, and temperature are known to have very significant and very

different relations to various particles and to various ferments; and the same may be true as to electrical and other atmospheric conditions.

The same ferment is very differently effected by different degrees of dryness or moisture, by different heat conditions, or by being operated upon conjointly by these or in the presence of certain morbific conditions of atmosphere. The precise unity of conditions may not obtain, although the material is in waiting; and so the mode of diffusion may be unavailable, or infective particles, most of which are ephemeral, perish for want of opportunity.

A question also arises, whether a natural ferment may, by some unknown operation, be suddenly changed into a disease ferment, or whether a harmless microphyte may give rise to a disease microphyte. Dr. Buchner of Munich claims by cultivation to have transformed the *bacillus anthracis* into the hay *bacillus*, and *vice versa*. (See also Sternberg's recent experiments.)

It would seem, in some cases of malignant disease, as if that which had long been benign suddenly became malign.

Dr. Woodward, in a monograph on cancer, in the Toner Smithsonian course, relates some important facts.

I had, in my own experience, a case of a small tumor, caused by a kick, and which had existed for twenty years, that suddenly took on a malignant type.

That there are diseases in which a very unusual growth and multiplication of microphytes takes place and is associated with disease, is not questioned by those who recognize the presence of germs. "Many an infant," says Beale, "suffers from the extraordinary development of *bacteria* in the alimentary canal, and some children die from the state of things thus engendered" (p. 37). Cases of such enormous and rapid multiplication causing crises in disease and cases of disease modified by the stage of development are now conceded.

All this seems to us to show that we need to be very closely studying the growth and stages of growth of mycrophytes in their effects, as also all the phenomena connected with fermentation and putrefaction, as set up by external or internal causes, in order to know the bearing of these on the laws of epidemics.

It is for this reason that we place a value on such investigations as those of Sanderson into the "pathology of the infective processes," even far beyond the important facts which they have elicited. They mark out the hopeful future for sanitary and administrative medical practice.

Two or three leading facts are already so far authenticated as to be fairly within the range of theories potent with large possibilities. One of these is, that when we are collecting and retaining secretions, excretions, decay, putrefactions of various kinds, we are constantly liable to the production of some specific form, or what for the present we may call a "septic ferment," which either originates a new epidemic, or so changes a common, prevalent disease like diarrhœa into a specific type, as that it becomes a cholera or other flux of the most malign character.

It was easy away back, as it is now, to say that no case of small-pox could arise without an antecedent case any more than a child without its parent.

But it is not needed to infer from this that erysipelas, puerperal fever, diphtheria, or typhoid fever never occur except from a previous case, or that there may not, from time to time, arise new epidemics, resultant from new combinations of befoulment under some peculiar conditions of accumulation, temperature, moisture, electrical condition, etc.

It may be extremely improbable that any case of small-pox now occurs without an antecedent case, or that true Asiatic cholera occurs unless there is exposure to the person having it, or to some of the changed excretions. But this must not be made into a generalization in the face of what now appears so probable, that new diseases do occur; or that new forms and types occur of old diseases; or that there may be hybrids in diseases as well as in flowers; or, perchance, that a common disease like diarrhœa may, under special conditions, change from a benign to a malignant or epidemic type by reason of the production of some new infection.

In respect of all communicable diseases, this must be a matter resting on evidence and on series of facts so closely observed as to eliminate sources of error. In respect to typhoid fever, diphtheria, scarlet fever, etc., the subject is one that must be held in suspension.

Another important question arises: May we not fortify the system against being thus invaded, or so invigorate it when invaded, or so infuse into the blood certain ingredients, as to interfere with the intrusion and development of these multiplying or extending processes which constitute the gravity of so many diseases?

Many a fungus which destroys a higher life, as the mistletoe finally does the oak, might be prevented from fastening and from spreading in the start, whereas the evil done cannot be stopped or remedied after it has obtained full possession. The study of all parasites as related to plant and animal life is now receiving great attention. Some curious facts come to light which cannot but have their bearing on disease.

No more important study now presents itself in preventive sanitation than to determine (*a*) the mode and locality in which infective particles are introduced into the system; (*b*) the conditions which determine their mild or virulent development. The condition of the individual has very much to do with determining whether a given contagion shall be capable of starting its processes within him. While there are some diseases which seem to find a pabulum in every person exposed, there are others which are prevented from sedation and development by causes within the individual, which are not arbitrary, fortuitous, or accidental. The fact that not only individuals, but classes of individuals, escape some communicable diseases more than do others, must lead to close study of the antecedent preparation of the individual so that he may not contract the disease, or, if contracting it, may have it more mildly. Again, (*c*) how far, by introducing certain substances into the blood beforehand, or at the very inception of the morbific action, may we so prevent or control the extension and proliferation as to hinder or abort the disease, so making the system an impossible field for the epidemic? The observation of

several years, and actual experiments and results, as before declared by us, have long since satisfied us that individual prophylaxis, or the individual factor in disease, is deserving of exact study as one of the most hopeful methods of limiting or preventing epidemics.

Just as in nature, by the presence sometimes of very slight substances, we may drive away insects from that which they usually seek as their food, or may prevent vegetable parasites from doing their usual destruction, or may, by some slight infusion of some other substance, interfere with developing the usual fermentative process or destroy the young in the period of infantile life, so we may exercise a similar control over the human tissues, and prevent that series of changes which causes fatal morbidity.

It is interesting to notice the progress of doctrine and illustration of this idea which has taken place since we first advocated this antecedent treatment.

In addition to evidences noted in former communications to this body and to other societies, the therapeutic view is well stated by Lauder Brunton in his recent work.

In his concluding chapter he says, that "facts all seem to point to ferments, or enzymes, as the agents by which the tissues are built up and pulled down in that constant change which continues during life; and the action of drugs upon those enzymes is becoming one of the most interesting questions in pharmacology."

Not less is it recognized that their action on infective particles is in the same direction. If the rapid proliferation could be opposed and prevented as absorption begins, it would prevent the development and imminence of many diseases. If the evil is in the kind and process of fermentation, rather than in the swarming infusorial life, the principle is the same.

We believe the time will come when the fortification of a body against prevalent epidemics will be a matter of exact regimen and treatment; and when, by the introduction of certain articles into the blood, and their maintenance there during an epidemic, as now shown to be fully possible, we shall as surely prevent individual attack as by any other method of isolation. This may be somewhat different for different infections, and we may need closely to study the condition as to each; but, if only thus we can insure individuals against attack, it will be a method of delivery for persons, and of limiting disease from assuming epidemic proportions, next in importance to the removal of the causes of disease, and mark an era, both in preventive and administrative medicine, second to none in its results.

In this inquiry we need to study the habits of each infection, its modes of entrance, its line of development, its place of sedation, and its point of especial lesion, with the exactest observation, and with series of recorded experiences; since it is just thus that every naturalist is able, by his analysis of facts and the natural history he works from them, to make his science.

It is no more wonderful that one infection should centre on the throat or in the lymphatics, and another on Peyer plates, and another in the spinal cord,

than that one animalcule should be in rain-water, another in cheese, and all the thousands besides should each choose their pabulum and their nestling-place.

We do not even need to watch animal life only or chiefly. Whoever will study spores, will watch mould, or any of the minute order of parasitic plants, or the varied fungoids which form the coatings on the tongue in various states of health, will not be slow to conceive how disease may be constituted out of such embarrassment, how choice may be made by each as to locality, how they may permeate and multiply so as to embarrass and supersede and suspend human life, and how hopeful may be our effort to render the system refractory thereto. Prophylactic and administrative medicine have no more inviting study. We venture to predict that the next thirty years will see such a practice adopted as will prohibit epidemics from attacking those, who, by proper regimen, and a systematic use of the antagonists to contagious particles, prevent proliferation and resultant depreciation, — a process which alters the consistence of life-fluids, and suspends life by setting up growths and metamorphoses inconsistent with the integrity of the superior life, which is thus overpowered.

In our attempts to arrive at conclusions as to the causes of epidemics, we think we need to guard against the effort to make them all amenable to one law. That hypothesis is claimed to be the best which will account for the greatest number of facts. But it does not follow, that, for this reason, we are to attempt to bring all epidemics under one hypothesis.

Because we can prove that in most cases we find an antecedent case as a cause of scarlet fever, it does not forbid the additional hypothesis that it does sometimes occur from meat and blood decompositions, if enough facts in evidence can be brought to show this to be an occasional origin.

Because some diseases are communicated by the person, and others by the secretions or excretions, and others only by these after-changes, this in no wise debars us from the belief that there may be another class, like the recent epizoötic, that may depend on atmospheric conditions alone, and so be neither the product nor concomitant of filth.

Our classifications must not press into conformity with one law every thing we call an epidemic, since such have the same right to be different in order, genus, and species, as have many other things on which science labors.

It may yet be shown, that, in some diseases, the virulence of some ferment or proliferation or decomposition, formed by the concomitance of adventitious circumstances, may have caused the disease; in others, that it is the quantity of besiegement of the individual by some of the low forms of life distinct from his usual inhabitation; in others, a multiplication so rapid as to clog up the blood-paths or organs, or to suspend oxygenation; in others, a peculiar state of the system, by which, on their introduction from without, the body becomes rapidly disintegrated.

There are many things, too, as to climatic and atmospheric conditions, which

are important factors, and which we may never be able to control. This, however, does not warrant the inference that we will not be able to limit the influence. Much of our knowledge of the prevention of disease must consist in a proper estimation of the potency of the various operative causes which make up the result. Then very much of our power will consist in an interruption of the coincidences and combinations of circumstances which alone give vigor and fatality to most epidemics.

Sanitary science and the art of prophylaxis are constantly re-assuring us that these we can estimate, and that we can often thwart the coalition when we cannot slay each individual factor.

The successful practice by which we prevent the epidemicity of disease by preventing and removing filth, or by the antiseptic treatment of wounds, or by the introduction of antizymotics into the system as a preventive of disease, does not await the finding out whether the contagium is a dead or a living particle, however desirable the knowledge may be. But it does recognize our power to interfere with the coincidence and co-operation of the forces upon which the existence or prevalence of the disease depends. The pride of modern sanitation is, that it does appreciate so many of the conditions on which the advance of epidemics depends, that it is able to thwart their massing for onslaught, and that it is branching out in more radical directions to see if it cannot prevent the genesis, enlistment, and organization, and so arrest the assemblage, of the forces for attack. We have thus sought to bring into prominence the directions of thought and investigation as to these diseases, and close by summarizing the chief ones in the following propositions: —

I. Communicable diseases are owing to a contagium which is particulate. The contagium is not the same, as to its mode or facility of conveyance, in all cases or in all diseases.

II. Therefore some communicable diseases are only acquired by contact, some by the suspension of the infective particle in air or water, some by changes in the secretions or excretions which have taken place after voidance from the body. Whether a contagion has any one, or any two or more, of these modes of ingress, is a matter to be determined only by the study of closely observed facts.

III. Some contagiums have only an origin external to the body, while others have an origin only within the body. In either case they seem to be connected with decompositions, attended with extraordinary processes of a fermentive or putrefactive character. It is also possible that some diseases have an origin both within and without the human body.

IV. The development of most of the zymotic diseases is coincident with the presence of specific microzymes. Whether they are the causes of the changes occurrent or mere incidentals, and whether, by changes they cause, or the food or air they appropriate, or the mechanical clogging they make in vital parts, they make the crisis in a disease, is to be gravely suspected, but is not yet investigated so as to be accepted as proved.

V. If, as appears, the presence of special forms is diagnostic of certain

diseases, these are to be studied specifically as a means of diagnosis, as well as in their special relations to the disease in hand.

VI. Whether any disease which is known to be derived from authenticated cases is, in some instances, also developed by extraordinary processes within the body or in its surroundings, can only be made certain by series of definite and classified facts accurately observed and recorded.

VII. Whether new epidemics arise from new combinations of matter incident to modern civilization, or whether there are hybrids in disease as well as in plant-life, can only be determined in the same way.

VIII. There is a very hopeful study in preventive art, in the direction of finding out whether we may not, by preliminary treatment, and a presence in the system of medicaments resistful of such fermentation and inimical to the development of these microzymes, or destructive of them in their changing state, suspend the morbid processes attempted to be instituted, and so prevent serious disease.

IX. As there is so much difference in the way in which the same contagion affects different persons, or in its choice of persons, we have reason closely to study the bearing of individual conditions on the acquirement and development of contagions, so as to know why some escape attack and others are susceptible.

VI.

THE RELATIONS OF SCHOOLS TO DIPHTHERIA AND TO SIMILAR DISEASES.

By HENRY B. BAKER, M.D.,
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A DISEASE which in one year (1859) caused in England over ten thousand deaths; in another year (1873) over one thousand in New York City; for each of two successive years (1876, 1877), in Massachusetts, over two thousand deaths; which, for the eight weeks ending with Nov. 13, just passed, caused an average of forty deaths per week in the city of Brooklyn alone; and which, when once introduced into a city or State, does its work year after year with varying but with certain effect; a disease which, for the last twenty-three years, has been gradually extending itself over the whole northern belt of our country, and which declines only to rise again in periods of four to ten years, — is a disease whose ravages are no less terrible than those of yellow fever, and which demands the attention not only of local, but of State and national, boards of health.

Perhaps the first question which the title of this paper will suggest to some minds may be, whether diphtheria has any necessary or common relation to the schools. Bearing in mind the numerous cases on record where diphtheria has undoubtedly been conveyed from person to person, some may be ready to assume that there must be danger of spreading diphtheria if children affected with the disease attend the public schools; yet very little attention seems to have been given to this subject, and comparatively little has been done toward the prevention of the spread of diphtheria in this manner. Among a certain class of sanitarians the tendency of thought on the subject seems to be similar to that which prevailed a few years ago with reference to scarlet fever, when the nature of that disease was not so well understood as it now is, outbreaks of which were then frequently attributed to sewer-gas, or to decomposing organic matter in some form. Now we do not hear much of the filth origin of scarlet fever, or even of the propagation of the disease in that manner. It is a generally accepted fact that the contagium of scarlet fever is reproduced in the body; and, so far as I know, there is no *conclusive* evidence of its reproduction outside the living body, in filth, or in cultivation fluids, — such, for instance, as Pasteur's solution. I suppose there is hardly a person present who doubts the communicability of scarlet fever, or who doubts its ready communication by and to children in schools. If this is so, it is unnecessary to offer further proof on this point: but, though this is well and generally under-

stood with reference to scarlet fever, it seems to me, that, though true, it is not generally understood as regards diphtheria; consequently, I venture to offer evidence on the subject of the *mode of spread of diphtheria*, as essential to a knowledge of the relations of schools to diphtheria. Part of the evidence offered in this paper is *direct*, and part of it is *indirect;* the indirect evidence relating mainly to the most frequent mode of spread of diphtheria, — as to whether it is generally by contact with something derived from a previous case, or whether the cause of the disease is capable of being reproduced or multiplied in filth outside the body, for which latter hypothesis the evidence seems to me to be mainly negative or inconclusive. The bearing of such evidence on the subject of this paper is manifest, because diphtheria is known to affect children at the school ages; and, if the disease is generally communicated from person to person, the relations of schools to the disease must be very important. On the other hand, if diphtheria is, as some have supposed, a "filth disease," affecting children more than adults, the relations of schools to diphtheria may yet be of importance, because the sanitary arrangements of schools are not always, perhaps not generally, good.

IS DIPHTHERIA A FILTH DISEASE?

Such paragraphs as the following are frequently seen: —

"The health department of Chicago has been examining the sewerage to houses where deaths had occurred from diphtheria, and find it defective in seventy per cent of the cases reported."

The inference from this apparently is, that some useful statement is made; but to me the statement seems barren, because nothing is said of the proportion of houses with defective sewerage where diphtheria did not prevail. Of what use is it to know that the sanitary conditions were bad where diphtheria prevailed, if we have no means of applying the fact, no knowledge of the conditions in localities where it did not prevail, and no knowledge of the conditions in the same place before and after it prevailed? There can be no intelligent study of the subject in this direction until we have complete sanitary surveys of the cities or localities in which diphtheria is to be thus studied.

But even if, after we have positive knowledge, it turns out that diphtheria is more prevalent or more fatal in filthy localities, it will then remain to be ascertained whether the filth is a cause or only a frequently coincident condition, and the disease prevails most, just as small-pox does, among the most improvident classes.

The experience with diphtheria at Pittsburgh, Penn., where the disease followed somewhat closely the course of a filthy sewer, proves nothing of itself, when we consider that any communicable disease tends to follow streets or other lines of easy communication, and to spread in thickly settled places. It is needful to have a great many repetitions of such experiences, and to eliminate the effects of other known causes, in order to reach conclusions respecting the relations of filth to diphtheria. Meanwhile, it is, in my opinion,

premature, to say the least, for sanitarians to teach people that diphtheria is certainly a filth disease. Professor Huxley, in his address at the dedication of Sir Josiah Mason's Science College, in speaking of scientific training, has lately said, "It warns us that the assertion which outstrips evidence is not only a blunder, but a crime." [1] Certainly, if this is true in any science, it is in sanitary science.

DOES AËRIAL FILTH SOMETIMES PROTECT FROM DIPHTHERIA?

It may yet be well to consider some evidence tending to show that filth may sometimes prevent diphtheria. The statistics of sickness collected by the State Board of Health in Michigan, and the statistics of deaths in the same State, both show, in connection with the meteorological statistics in that State, that diphtheria has very strongly marked relations to meteorological conditions. One of the diagrams which I submit herewith (facing p. 110) has been prepared to show something of the relations of sickness from diphtheria to meteorological conditions in Michigan. It gives, for the four years 1876–79, the per cent of the weekly reports of sickness which stated diphtheria to be present, the reports coming from an average of about sixty localities in Michigan. In studying this in connection with the diagram of deaths from diphtheria in Michigan (facing p. 111), it should be remembered that the deaths are not all returned, and that in the returns a larger proportion is omitted for the first than for the last part of the year, so that the range of the line representing deaths is not as much like that representing sickness, as would be the case were all the deaths returned. It has been proved, to my mind at least, that diphtheria prevails most in Michigan when the air is cold, dry, and contains an excess of ozone. There is reason to believe that ozone sometimes irritates the air-passages, and that it may tend to induce a condition of the throat susceptible to the cause of diphtheria. Professor Kedzie, Vice-President of this Association, has pointed out that the ozone which is apparent by our tests is "residual" ozone, — that which is left after its oxidation of whatever in the air is capable of oxidation. From this it follows, that, as a rule, other things being equal, ozone is most abundant where it has least filth, or substances which it can oxidize. This evidence seems to me important, because it appears to explain why, in certain cases which I have myself observed, the ruddy, rosy-cheeked children, frequently bathed, and in cleanly houses, have been among the first to succumb to diphtheria, contracting the disease after some unusual exposure in the open air. If the facts are, as I think the evidence indicates, it is important that they be known in connection with the subject of the *ventilation* of schools; for a system of ventilation which might greatly lessen the filthy exhalations in a schoolroom, might yet, by bringing in air too cold and dry, and too strongly charged with ozone, cause much more sickness than it prevented, if it favored the spread of diphtheria or any other similar communicable disease.

[1] "Nature," 1880, p. 547.

SICKNESS FROM DIPHTHERIA. — PER CENT OF WEEKLY REPORTS [1] STATING PRESENCE OF DIPHTHERIA IN MICHIGAN, BY MONTHS AND YEARS, SEPT., 1876, TO DEC., 1879.

Years.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1876	..	..	..	..	..	..	..	..	..	11	29	26	39
1877	19	33	24	19	16	8	10	10	7	12	25	29	26
1878	23	30	24	23	22	14	12	12	16	19	27	35	40
1879	29	39	36	26	22	20	20	18	24	23	34	44	42

DEATHS RETURNED AS HAVING OCCURRED FROM DIPHTHERIA IN MICHIGAN, BY MONTHS, FOR EACH OF THE YEARS 1876, 1877, AND 1878.

Years.	Year.	Average Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown Month.
1876. .	311	26.	24	16	21	12	14	13	12	24	39	51	46	38	1
1877. .	593	49.42	31	26	38	25	32	24	33	40	81	105	84	73	1
1878. .	887	73.9	56	63	51	40	42	34	36	58	113	131	134	127	2
1879. .	1,473	122.75	95	48	68	81	68	56	81	137	180	232	208	217	2

[1] The number of weekly reports received was as follows: —

For Year	Total.	Average per Month.	Greatest No. per Month.	Least No. per Month.
1877	3,320	277	386	215
1878	3,221	268	353	234
1879	3,755	313	395	248
Observers for year —				
1877	115	66	78	55
1878	97	64	73	59
1879	110	73	83	60

THE IMPORTANCE OF STATISTICAL EVIDENCE.

Statistical evidence, such as the greater part of that in this paper, may not be as conclusive to some persons as would be evidence of direct experiment, as to whether diphtheria can be communicated by filth, and as to whether the contagium can be reproduced in filth, or in Pasteur's solution; but it must be admitted that statistical evidence is at least as important as any other: for, even if direct experiment shows positively that the contagium can be reproduced in filth, it would still be an open question whether it is *generally* so reproduced, and the disease spread in that manner; so that in the end we must rely on statistics of sickness and of deaths from this disease, and statistics of coincident conditions, for accurate information of the facts in the case.

. SICKNESS FROM DIPHTHERIA, IN MICHIGAN, BY MONTHS, IN 1876, 1877, 1878, AND 1879.

SCALE.—10 PER CENT OF REPORTS TO .84 INCHES VERTICALLY.

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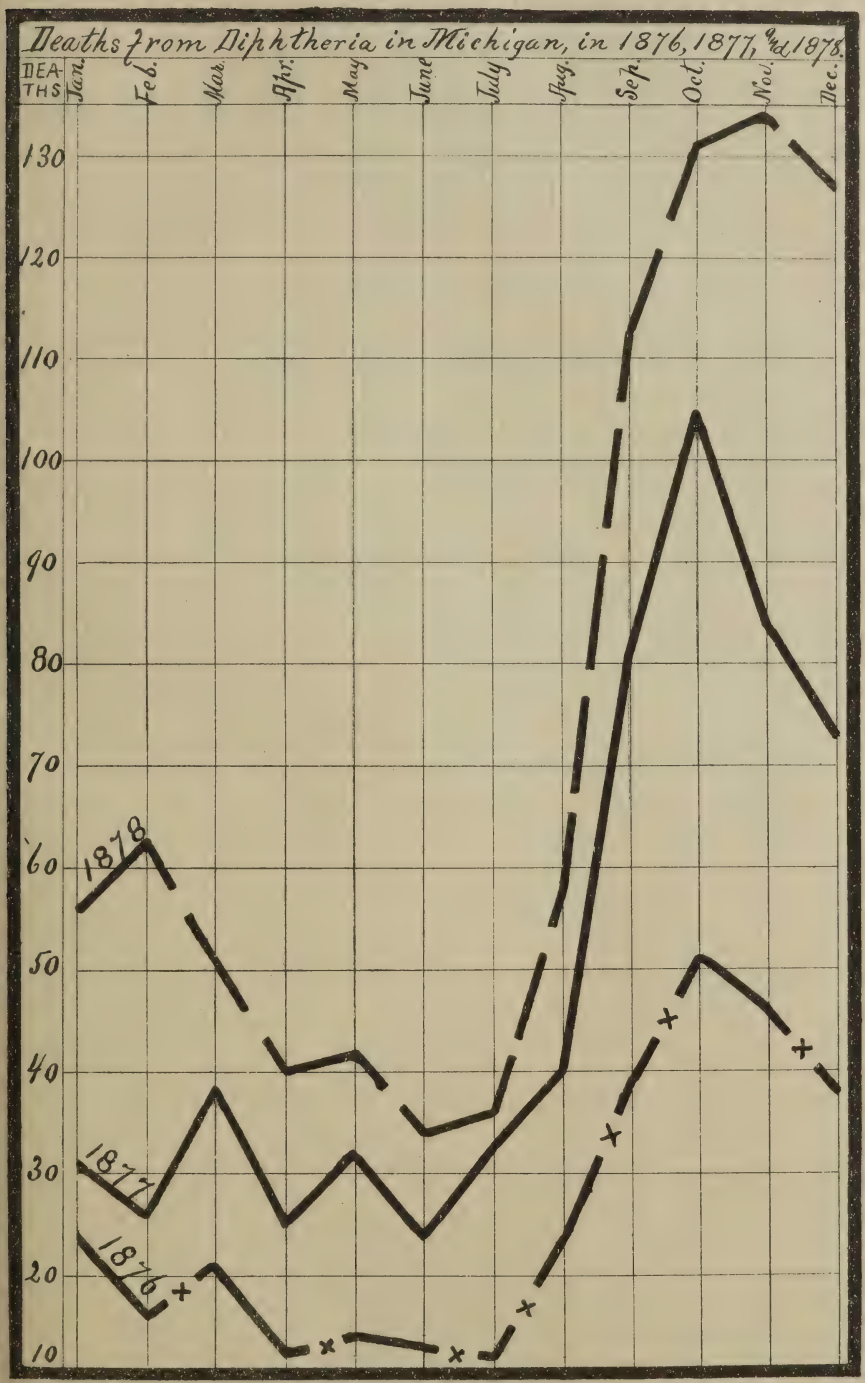
DEATHS RETURNED AS HAVING OCCURRED FROM DIPHTHERIA, IN MICHIGAN, BY MONTHS, FOR EACH OF THE YEARS 1876, 1877, AND 1878.



SCALE.—10 DEATHS TO .54 INCHES VERTICALLY.

We need direct experiment on this question by competent persons; but the immediate value of the evidence which we may get therefrom will depend greatly upon what answer is reached: for, if the experiments show that the contagium cannot be reproduced outside the body, the fact is important without further work; if they show that it can be reproduced, we must fall back upon other evidence, and preferably upon statistical evidence, as to whether it is thus generally reproduced and spread.

CHILDREN MOST SUSCEPTIBLE TO DIPHTHERIA.

Diphtheria is more fatal to children than to adults. Children also seem to be most susceptible to the disease.[1] These same two statements are now true of scarlet fever, measles, whooping-cough, and chicken-pox; and, previously to general vaccination, the same statements were true of small-pox. This evidence, though worthy of thought, is not so valuable in this connection as it would be if some diseases not known to be communicable — such, for instance, as diarrhœa — did not also prove most fatal to children; but one fact in relation to this subject seems worthy of mention, because it may have a bearing upon a main question involved in the subject of this paper. In Michigan, at least, the proportion of deaths reported of children between the ages of five and ten years, compared with the deaths of those under five years of age, is considerably greater in the deaths from diphtheria than in those from scarlet fever, croup, diarrhœa, or any of the diseases which particularly cause the death of children. In my mind the question arises, whether diphtheria is spread less than is scarlet fever by aërial dust, which reaches children under five years of age by way of infected clothing; or whether this greater proportion of deaths from diphtheria among children over five years of age may not be because children over five years of age attend the public schools, and because diphtheria is spread more than is scarlet fever by such contact as there occurs.

DEATHS RETURNED AS HAVING OCCURRED FROM DIPHTHERIA IN MICHIGAN, BY STATED PERIODS OF AGE, FOR EACH OF THE YEARS 1876, 1877, AND 1878.

Years.	Ages in Periods of Years, — Number of Deaths.																	
	Total.	Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.	40 to 45.	45 to 50.	50 to 55.	55 to 60.	60 to 65.	65 to 70.	70 to 75.	75 to 80.	80 and over.	Unknown.
1876. .	311	140	103	34	9	5	1	5	3	1	..	1	..	..	1	1	..	..	7
1877. .	593	252	210	86	20	6	7	2	2	1	1	..	..	..	2	1	..	..	3
1878. .	887	366	309	131	41	10	5	4	1	1	3	3	3	1	..	1	1	1	6
1879. .	1,473	630	506	233	53	15	7	5	3	2	2	2	1	1	..	..	1	..	12

[1] These two facts should be kept in mind by all who experiment with a view to producing diphtheria in animals: otherwise no satisfactory results need be expected.

DIPHTHERIA A COLD-WEATHER DISEASE IN COLD CLIMATES.

In this country at least diphtheria seems to have prevailed more in the cold than in the warm latitudes, more in winter than in summer. This is true of scarlet fever: it is also true of small-pox. The explanation does not seem to me to be difficult, if we suppose diphtheria and scarlet fever to attack the body where they seem to attack it; namely, at or near the entrance to the air-passages. Any one who has lived in a cold climate in the winter knows how much more liable one is in cold weather to have sore throat, "chapped" lips as well as chapped hands, influenza, etc., — all of which conditions supply a raw surface for the reception of the contagium of a disease, which for its reception requires to gain entrance to the body in some such way. Besides, ventilation of rooms is much less complete in winter than in summer. In its time and area of most frequent occurrence, therefore, diphtheria seems to be allied to certain diseases known to be communicable; and it may here be remarked, that, in its time and area of greatest prevalence, the evidence shows that diphtheria is not allied to diarrhœa, the disease perhaps more generally than any other attributed to filth as a cause; nor is it in either its time or area of prevalence allied to cholera, a communicable disease, the spread of which is more than that of most others attributed to filth. On the contrary, the commonly accepted filth diseases prevail most in warm climates, and in the warm season in temperate climates; while with diphtheria, according to my observation, the reverse is true.

But whatever the cause, or the mode of spread, of diphtheria, it is important that we know the time of greatest danger in order best to guard against it. It is well to remember that it prevails most in cold weather.

PERIODICAL RISE AND DECLINE OF DIPHTHERIA IN A SERIES OF YEARS.

Although diphtheria has been known by medical writers for centuries, its prevalence in this country and in England has not been general until within comparatively recent times. According to the report of the Board of Health for New York City for 1873, diphtheria first appeared in that city, in this century, in 1852: but in 1857 only two deaths were reported from it; in 1858, five deaths; in 1859, fifty-three deaths; increasing rapidly in succeeding years to a maximum of nearly a thousand deaths (981) in a single year (1863), when it declined, and rose toward another maximum, reaching 1,151 deaths in 1873. The regular rise and decline of the disease, which is apparent wherever it is studied for a series of years, is strong evidence in favor of the view that diphtheria is simply a communicable disease, and not generally, if ever, connected with filth as a cause. This line of evidence seems to me of such importance, that I submit herewith a table exhibiting statements for a few cities, States, and countries, showing the numbers of deaths in each for a series of years, beginning with the first notice of the disease in each place. From the table it may be seen that, in each instance, there are more or less regular periods of increase and of decrease of the deaths from this disease.

It may also be seen that the periods of greatest prevalence are not always the same in all the places, though in some years (as in 1863) there was an increased prevalence in all the places included in the table. Contiguous counties and contiguous States sometimes reach a maximum in the same year, as, for instance, Massachusetts and Rhode Island in 1877; while Michigan had not as many deaths from diphtheria in 1877 as in 1878. Such facts are explicable if we consider that diphtheria is known to be a communicable disease; but I see no ready explanation if we ignore this, and seek to account for the disease as caused by filth.

DEATHS FROM DIPHTHERIA IN PLACES AND FOR YEARS STATED.

PLACES.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.
England[1]. . .	385	603	1,583	6,606	10,184[8]	5,212[1]	4,517	4,903	6,507[8]	5,464	4,145	3,000	2,600
New York City,[2]	..	..	2	5	53	422	453	594	981[8]	781	534	435	251
Philadelphia. .	..	..	..	..	..	307	502[8]	325	434	357	260	192	119
Massachusetts[3].	..	..	..	18	32	258	643	663	1,420[8]	1,231	672	399	251
Rhode Island[4] .	..	..	..	6	20	67	140	81	155	160[8]	82	64	31
Vermont . . .	..	..	..	14	60	212	441	818	1,225[8]	843	371	190	73
Michigan. . .	Statis	tics no	t colle	cted u	ntil 18	68. T	he dis	ease p	revaile	d in 18	63. ..	..	110[7]

PLACES.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	..
England[1]. . .	3,013[8]	2,606	2,699	2,525	2,152	2,531	3,560[8]	3,415	3,151	2,731	3,498	..	..
New York City,[2]	276	328	308	238	446	1,151	1,665	2,329[8]	1,750	951	1,007	671	..
Philadelphia. .	119	182	172	145	150	110	179[5]	652[6]	708[8]	458	464	321	..
Massachusetts[3].	297	296	242	274	273	310	502	1,200	2,610	2,634[8]	1,934	1,734	..
Rhode Island[4] .	20	33	33	57	48	45	59	33	159	492[8]	435	259	..
Vermont . . .	47	52	68	32	49	65	113	114	183	391	403	..	..
Michigan. . .	729	89	121	121	192	217	213	207	311	593	887	1,473	..

[1] The line for England includes, with diphtheria, deaths returned as from angina membranacea from and after 1860. It also includes, with diphtheria, deaths returned as from cynanche maligna; of these there were, as stated in a letter from Dr. Noel Humphrey of the Registrar-General's office, 199 in 1855, 1,273 in 1857, and 1,770 in 1858. In the same letter Dr. Humphrey says, "Certain it is that the term 'diphtheria' was only slowly and gradually adopted, although the disease was to some extent previously [to 1859?] returned under other names, as 'cynanche maligna,' 'putrid sore throat,' or even 'croup,' and 'laryngitis.'"

[2] "The first death from diphtheria in the city was certified as that of a German woman aged 24, who died on the 15th of February, 1852."—*Report Board of Health, New York City, 1873.*

[3] For the nineteen years and eight months ending Dec. 31, 1860, there were returned in Massachusetts only 308 deaths from diphtheria, and these were in the years 1858–60. "None were reported in 1857, or, if any, they were so few as not to be separately stated in the tables."—*Mass. Reg. Rep. 1859, p. 68.*

[4] "The first deaths reported in Rhode Island from diphtheria, within the present generation, were in 1858."—*Twenty-fifth Registration Report, Rhode Island, 1877.*

[5] 179 according to report of Health Officer for 1878; 181 according to Report of Board of Health for 1875.

[6] 652 according to report of Health Officer for 1878; 656 according to Report of Board of Health for 1875.

[7] For year ending April 5, 1868, 110.

[8] Maxima.

[9] From April 5 to Dec. 31, 1868, 72.

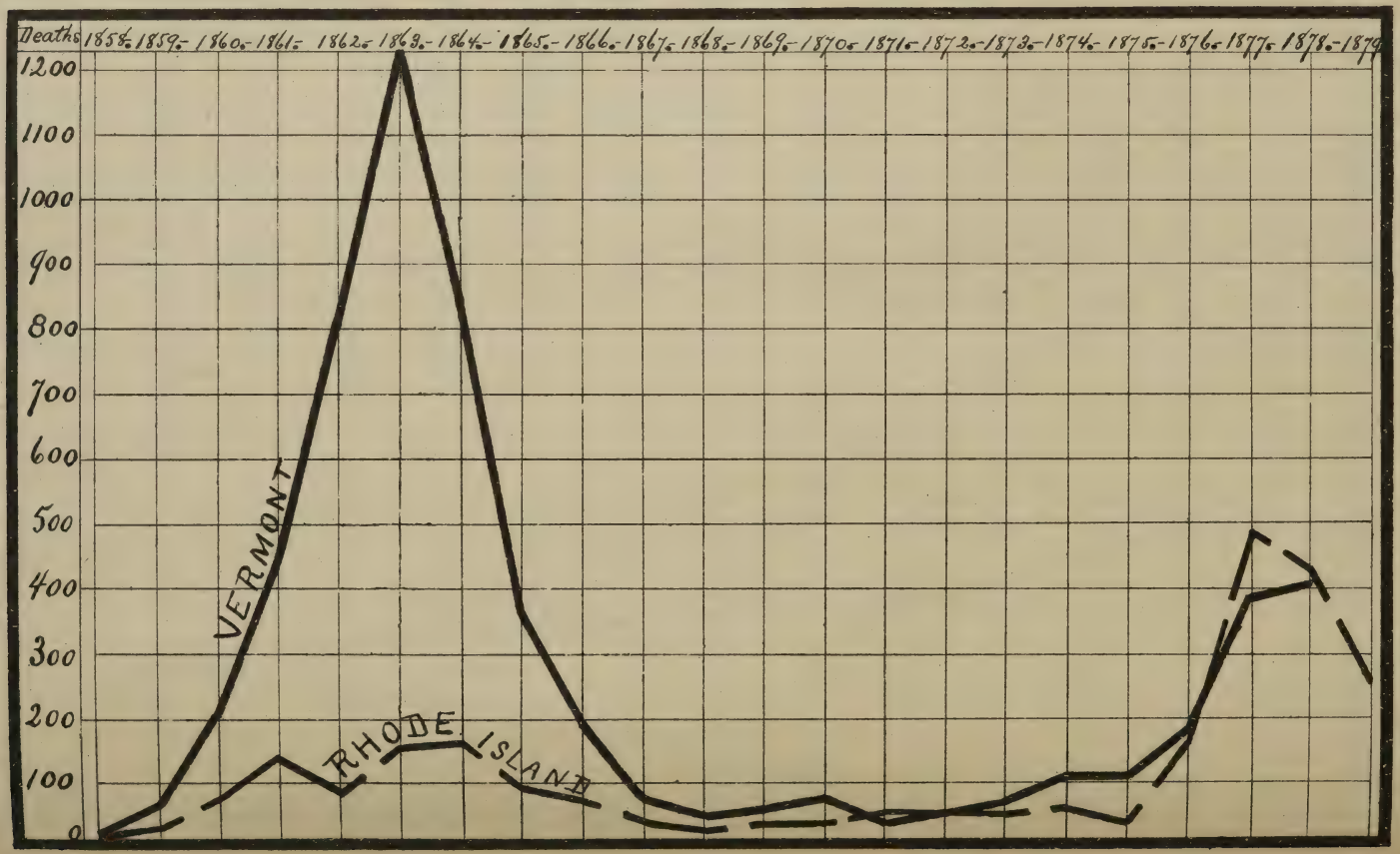
In order to present this fact of the regular rise and decline of diphtheria in a way to be easily apprehended, I have had prepared and I submit a diagram (printed on page opposite this) illustrating graphically the course of the disease, so far as it is shown by the deaths reported therefrom, in the State of Vermont, the data having been obtained from the vital statistics of Vermont, and covering a period of twenty years, beginning in 1858. From this diagram it may be seen that the deaths reported from diphtheria steadily increased in every year from 1858 to 1863, in which year 1,225 deaths were reported from that disease, — a greater number of deaths than from any other cause, even greatly exceeding the deaths from consumption. Nearly twenty-three per cent (22.96 per cent) of all deaths in Vermont in that year were from diphtheria. From the year 1863, the deaths reported from this disease declined at about the same rate as they had previously advanced, until, in 1868, it had reached nearly as small numbers as in 1858. It will be seen that the deaths steadily increased for five years, and as steadily decreased during the next five years. This is just what might be expected of a communicable disease not reproduced outside the body; but I know of no explanation of these facts respecting the disease in Vermont on the hypothesis that diphtheria is a filth disease. From the table it may be seen, that, in England, the reported deaths from diphtheria reached a maximum number of over ten thousand in 1859; that they reached another maximum in 1863, 6,507 deaths having been reported for that year; another in 1868, 3,013 deaths; another in 1874, 3,560 deaths reported. It thus appears that the first great rise, after the first noticeable appearance of the disease, reached a much higher point than did any subsequent rise; and this would be likely to be the case with a communicable disease, especially with one which was in some degree protective against subsequent attacks. It also appears that the time between the periods of maximum prevalence, or at least of reported mortality, was gradually lengthened; the first maximum occurring four years after the disease first attracted attention; the second one, four years later; the third, five years later; and the fourth, six years later than the preceding one.

The periodical rise and decline of mortality from a given disease, when studied for a series of years, has heretofore been pointed out as a characteristic of a communicable disease. If there is any way of employing the hypothesis of the filth causation of diphtheria so as to account for the periodic increase and decrease of that disease in the manner in which it appears to increase and decrease, it has not come to my knowledge.

HOW DIPHTHERIA MAY BE SPREAD IN SCHOOLS.

It is not alone by the breathing of infected air that diphtheria may be communicated from child to child in school. Indeed, those who deny that the air is often or ever a medium of communication of the disease, and who are at all familiar with the thoughtless ways of little children in school, must yet recognize that the possible means of communication by almost direct contact are many. Who has not seen a school-boy with his mouth full of marbles

DEATHS REPORTED FROM DIPHTHERIA IN VERMONT, AND IN RHODE ISLAND, FOR A SERIES OF YEARS; SHOWING STEADY RISE AND DECLINE OF DEATHS FROM THIS DISEASE IN VERMONT.



SCALE.—100 DEATHS TO .34 INCHES VERTICALLY.

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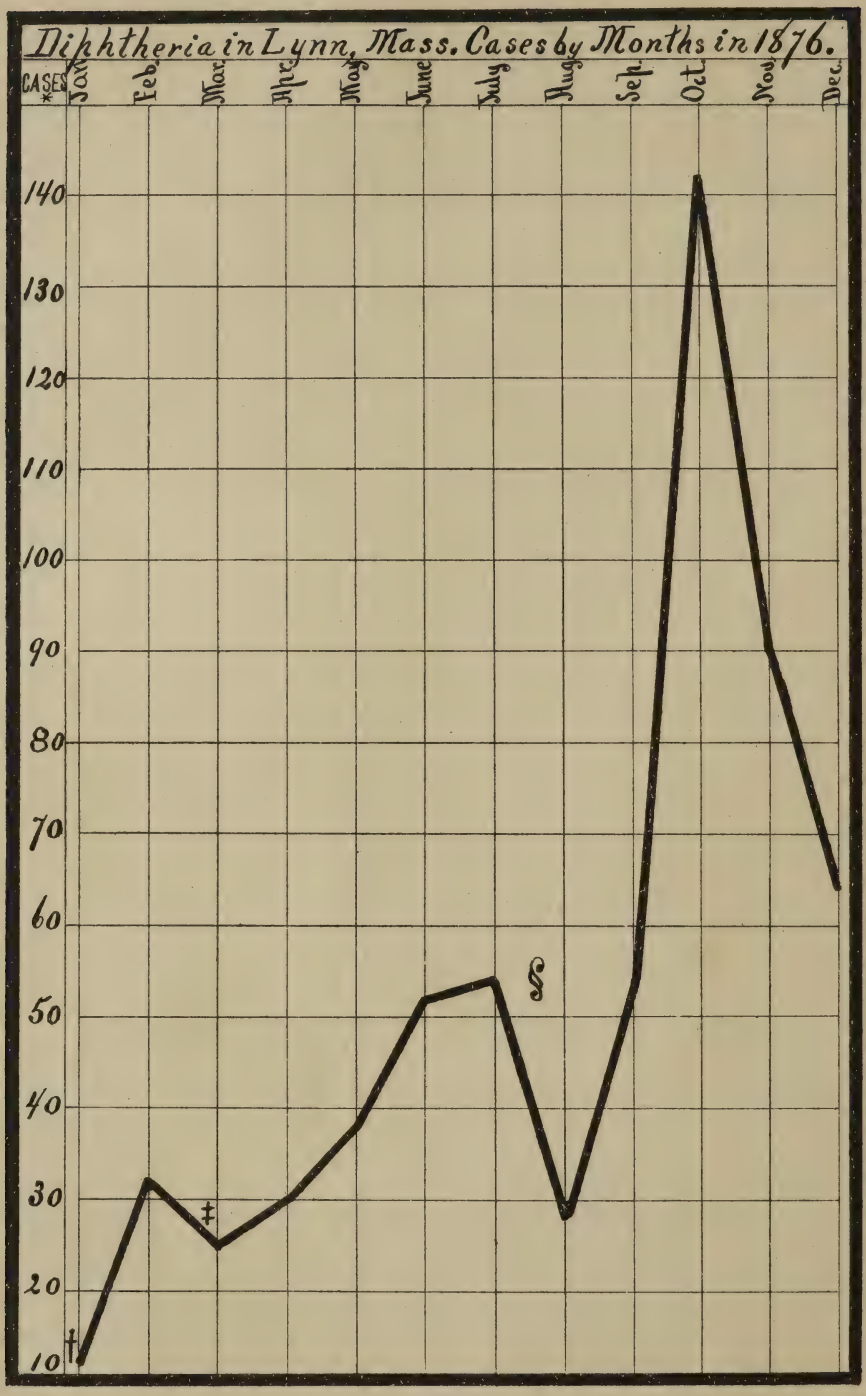
SCALE.—10 CASES TO .48 INCHES VERTICALLY.

† Schools began December, 1875; Epidemic began December, 1875.
‡ Vacation beginning February 29, and ending March 6, 1876.
§ "Schools opened September 4, after six weeks' vacation."

SICKNESS FROM DIPHTHERIA, AND TIME OF OPENING AND CLOSING OF SCHOOLS.



SCALE.—10 CASES TO .48 INCHES VERTICALLY.

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just taken from a mate? Children often borrow and lend pencils, which, by instinct, they wet in the mouth, or hold in the mouth; they borrow sponges of one another to wipe their slates, which they moisten with saliva. In so democratic a community as a primary schoolroom, it is a common thing for all the children of the room to drink from the same cup; their clothes commonly hang in close contact in closets and ante-rooms; they manifest their likes or dislikes by biting or refusing to bite from the same apple; and little girls often pledge eternal friendship by that classic symbol, "sharing gum." Though these things may occur outside the school, they are the more frequent the more children are brought together, as they are in schools.

DIPHTHERIA IN LYNN, MASS., IN 1876.

My attention having been attracted to a diagram in the eighth report of the Massachusetts State Board of Health, relative to diphtheria in Lynn in 1876, I was led to study the *cause* of the rise and fall of the line indicating the increase and decrease in the number of cases. The meteorological conditions, which were carefully given,[1] did not seem materially to have affected the course of the disease; and I was led to write to Dr. J. G. Pinkham, author of the article and diagram, inquiring at what time the *schools* opened in the fall. He replied that "the schools opened Sept. 4, after six weeks' vacation." This seemed to me to explain the fall and subsequent rise of the line, as it was coincident with the closing and opening of the schools. Afterwards I wrote, and inquired if there was a vacation in February or March. He replied there was a vacation "beginning Feb. 29, and ending March 6." I have had prepared a diagram illustrating what seem to me to be the relations of the schools to diphtheria, as it occurred at Lynn in 1876 (on page opposite this).

Starting at the month of January, we find the number of cases to have been twelve. This was "almost the beginning of the epidemic." If we say the beginning of the outbreak was in December, 1875, the line would begin in

[1] A table containing this data is herewith appended: —

METEOROLOGICAL CONDITIONS IN LYNN.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average temp. F. . .	31.3	28.7	34.0	42.8	54.5	67.7	73.2	69.2	59.2	47.7	41.3	23.8
Number of days fair . .	20	16	18	20	23	22	26	26	15	18	10	16
Number of days cloudy .	6	6	8	6	5	5	2	4	8	9	12	9
Days rainy or snowy .	5	7	5	4	3	3	3	1	7	4	8	6
Prevailing wind . . .	N.W.	N.W.	N.W.	N.W.	E. W.	E. W.	W. E.	W. to N.W.	E. W.	N.W.	W. E.	W.
Rainfall in inches . . .	1.83	4.72	6.04	3.37	3.21	1.07	7.36	0.55	3.67	1.67	7.92	3.64
Humidity: Relative .	74.79	75 38	73.12	65.60	66.67	73.40	67.80	67.40	73.50	65.30	76.70	73.50
Humidity: Absolute .	1.73	1.60	1.65	2.22	6.63	5.48	5.98	5.26	4.21	2.59	2.47	1.32

that month; and I understand the winter term of school began Dec. 6, 1875. In February there were thirty-two cases. In March there were but twenty-five, showing a decrease, owing, I think, to the vacation in the first week in March. The line rises in April to thirty cases, and in May to thirty-eight, and in June to fifty-two. There was a vacation from May 25 to June 4; but it does not seem to have had much effect in lessening the number of cases, though the number of cases might otherwise have been greater. It is possible there were other ways in which the children came together, in parties or meetings. In July there were fifty-four cases, in August but twenty-nine. This I account for by the long vacation from July 21 to Sept. 4. When the schools opened (Sept. 4), the line rises to fifty-four cases in September, and then rapidly rises to one hundred and forty-two cases in October, when it drops off suddenly to ninety cases in November, and to sixty-four in December. This drop in the number of cases may be accounted for as follows: During the month of August, during a vacation, the school committee passed the following order: "*Ordered*, That no pupil shall be allowed to attend school from any house in which small-pox, varioloid, scarlet fever, or diphtheria prevails; and no pupil having been affected with either of these diseases shall be permitted to return until convalescence is complete, and attested by a regular practising physician." It is reported that this order, for some reason,— perhaps from being issued during vacation, when children could not readily carry the news home, — was not obeyed in every instance, perhaps not generally; and on Nov. 28 the school committee issued a circular to the physicians, asking them to help enforce the order by urging parents to keep their children away from school while diphtheria or any contagious disease was in the family. The increased effort for the enforcement of the order probably contributed much toward the decrease in exposure, and consequent decrease in cases, by keeping away from school children liable to spread the disease. Another reason for the less number in November than in October may be that the attention of the parents was strongly called to the subject by the alarming number of cases reported in October, after which many may have kept their children away from school even when diphtheria was not present in their families, and thus have lessened the number *exposed* to contagion at school.

The further decrease in December is but a continuation of the result of the action in October. It should be noticed, however, that the disease had become general: a large number of the children of the city had then had the disease, and consequently there was a much less number among whom it could spread.[1] In other words, some part of the final decline of the disease must be attributed to a comparative exhaustion of the number of susceptible children.

Some of my reasons for believing that diphtheria was spread in Lynn in 1876 by the contact and association of children in schools may be summarized

[1] "In the city the ratio of ascertained cases is one to every sixty-five inhabitants; of ascertained and estimated cases, one to every fifty-four." — *Dr. Pinkham's Report.*

as follows: *First,* The disease is *known* to be communicable from person to person. The cause which I assign is therefore a "true cause," capable of producing the effects observed in this instance, if it was present and acting. *Second,* We have reason to believe that this supposed "cause" was "present and acting," there being no rule or order to forbid the attendance at school of those from families where the disease prevailed, or of those affected with the disease, until during the vacation in August. *Third,* A thorough search through all the ordinary meteorological conditions, influences connected with season of the year, the conditions of nativity, locality, sanitary surroundings, occupations, etc., failed to reveal any other assignable cause for the course which the disease took. It thus appears that the cause assigned is a "true cause," that it was "present and acting," and that "no other known cause was present and acting." When it is remembered that the spread of the disease began with the schools in December, 1875 (see the diagram facing p. 115); slackened when the schools had a vacation in March; increased with the opening of schools in April, May, June, and July; slackened when the schools had a vacation in July, August, and September; increased with the opening of schools in September and October; and only slackened after the citizens had occasion to be generally alarmed, after the Board of Education had invoked the help of physicians to aid in enforcing an order to stop the spreading of the disease by the schools, and after a large proportion of the children had already had the disease, — when, in addition, it is noticed, as is shown in the diagram which I have had prepared, that in two of the three instances the decline of the disease bears what may be believed to be a quantitative relation to the length of the vacation, I think it must be admitted by every candid and thoughtful person that the evidence is about as convincing as we usually have to base conclusions upon.

HOW CAN THE SCHOOLS GO ON WITHOUT DISSEMINATING DISEASE?

In relation to public sanitation, business interests are great; but educational interests are probably greater, at least to a rising generation, which is soon to displace us. Under present imperfect methods there seems to be no escape from one of two evils, — either the schools continue, and spread scarlet fever, diphtheria, and other communicable diseases, throughout cities and throughout States; or the schools are closed, and, though the public health, which is of the greatest consequence, is furthered thereby, the whole educational work is for the time broken up. What is worse, this breaking-up process must come still more frequently as time goes on, unless some improved methods are adopted, because modes of inter-communication are becoming more complex. Under present methods the schools are not closed promptly on the outbreak of a communicable disease, but only after the disease is quite general; and, as the germs of these diseases remain active for quite a long time, whenever the schools open, at least in the autumn, there is likely to be some pupil prepared to communicate one or more of the contagious diseases.

For the best interests of the schools and for public health we need an

entirely different kind of work from what we now have, — a much more thorough, systematic, continuous, and rational effort. Let us suppose that, instead of suffering, as we now do, a very considerable proportion of the children sent to school to die or suffer through life from the results of diseases contracted in the school, or instead of breaking up the schools every year or so and losing the entire benefits of the school for a considerable time, we were to employ constantly in each city a few experts to do away with both these evils. To me this seems entirely practicable, if people will unite in the work.

Let us consider what needs to be done in order that the schools may go on continuously, and yet not spread disease.

The two most important general principles of action should be: isolation of the sick, and complete disinfection of all infected material. In order that this shall be possible in relation to the schools of a city, it is essential to have such a thorough organization of the health authority of the city as that suspected cases of communicable disease shall be promptly reported to the local board of health, and be immediately visited, and the truth learned whether or not the case is one involving danger to the community. The health authority must be given money sufficient to have such work done with nearly as much promptness as the fire department displays in visiting the locality of a reported fire; and, as the firemen remain until the fire is out, so the health department might have its officer or employee remain until the disease is over: he should watch and guard the public safety. He ought to use disinfectants skilfully, and, if need be, as freely as water, until all danger of a fresh outbreak should be prevented. He should see to it that in no way does the disease spread. Now, if we do any thing, we quarantine all, sick and well, by closing the schools. An active health department should, at all times, have as perfect knowledge of the location of cases of diseases which endanger the *people* under its protection, as the fire department has of the buildings which are burning, and thus endangering the *property* under *its* protection. With such knowledge as this the health department could furnish the teacher of every school in the city with a list of all families in which there was a person sick with a communicable disease; and, if necessary, an agent of the health department, or some other qualified person, could act as sentry at each school, and keep out persons liable to communicate disease. As an additional precaution, even where there has been no known infection, all articles likely to convey disease into the school could be easily disinfected, if it were only a custom to do so, and provision were made for such disinfection. It would be easy to have a small room at every schoolhouse where the outer wearing-apparel, etc., could be disinfected and aired while the wearer was in school, instead of having, as is now so commonly the case, the clothing of all closely packed in an unventilated closet.

A SANITARY INSPECTOR OF SCHOOLS.

A sanitary inspector of schools is needed in order to secure the best results. He should be one of the executive officers of the board of health, and should

act with reference to general cleanliness, and especially with reference to the spread of communicable diseases. In some places it is customary to permit attendance at schools from families where communicable diseases exist, and of convalescents from such diseases, on the certificate of the family physician that it is proper and safe. Sometimes the time which has elapsed since the sickness is made to determine the return to school. I think this should not be permitted; but that the board of health, the health officer, or a sanitary inspector of schools, should control this whole subject, and that no convalescent from diphtheria, scarlet fever, etc., should be allowed to return to school until after all his clothing has been thoroughly disinfected; and this without regard to the time which has elapsed since recovery, if the time is less than a year.

The thorough disinfection of the clothing in a residence is, in many instances, difficult, and sometimes impossible, except the family temporarily vacate the house. This will involve a provision that has not, so far as I know, been made in this country; but it is so obviously essential to good sanitary work, that it seems strange that it has not been done. It would seem to be essential to successful restriction of the communicable diseases to have under the control of the board of health a hospital for temporary reception of inmates of infected houses, where washing, disinfecting, and bathing could be rapidly and efficiently performed while the residence was being disinfected and put in order.

MEANS OF AVOIDING DIPHTHERIA.

1. Avoid the special contagium of the disease. This is especially important to be observed by children, and by all whose throats are sore or tender from any cause. Do not drink from the same cup used by a person who has sore throat. Avoid receiving the breath of a person whose breath has a bad odor. Beware of crowded assemblies in ill-ventilated rooms. Do not wear or handle clothing worn by a person during sickness or convalescence from diphtheria.

2. Avoid exposure to wind and to breathing cold, dry air, also the use of vinegar or any other article of food which tends to make the throat raw or tender.

3. Do not drink water which has a bad taste or a bad odor, or which comes from a source which renders it liable to be impure, especially if there is reason to believe it may contain something derived from a previous case of diphtheria.

MEASURES FOR RESTRICTING DIPHTHERIA.

1. When a child or a young person has a sore throat, bad odor to its breath, and especially if it has fever, it should immediately be kept separated from all other persons, except necessary attendants to its wants, until it be ascertained whether or not it has diphtheria or some other communicable disease.

2. Every person known to be sick with diphtheria should be promptly and effectually isolated from the public. One or two persons only should take the entire charge of the patient, and they should be restricted in their intercourse with other persons.

3. The room into which one sick with diphtheria is placed should previously be cleared of all needless clothing, carpets, drapery, and other materials likely to harbor the poison of the disease. This room should constantly receive a liberal supply of fresh air, without currents or draughts directly upon the patient. It will be well also to have the sun shine directly into the room.

4. Notice of the fact that a case of diphtheria is in your household should promptly be given to the health officer and board of health of your township, city, or village, as the case may be.

5. Proper warning of the danger should be given to all who may desire to enter the house, by placing plain notices in conspicuous places near the entrances.

6. Nurses and attendants should be required to keep themselves and their patient as clean as possible: their own hands should frequently be washed and disinfected by chlorinated soda.

7. Soiled bed and body linen should be at once placed in boiling water, or in water containing chlorinated soda, chlorinated lime, or solution of chloride of zinc.

8. The discharges from the throat, nose, and mouth of a person sick with diphtheria, are extremely liable to communicate the disease, and should be received on soft rags or pieces of cloth, which should immediately be burned.

9. The discharges from the kidneys and bowels are also dangerous, and should be passed on old cloths and burned, or into vessels kept thoroughly disinfected by nitrate of lead, chloride of zinc, or sulphate of iron (copperas), and then be *buried* at least a hundred feet distant from any well.

10. All persons recovering from diphtheria should be considered dangerous to society; and therefore no such person should be permitted to associate with others, or to attend school, church, or any public assembly, — certainly not until the throat is healed, as also any sores which may have been on the lips or nose; and not until after the patient has had a thorough bath and thorough disinfection, and an entire change of clothing; and not until, in the judgment of a careful and intelligent health officer, he can do so without endangering others.

11. The body of a person who has died of diphtheria should, as early as practicable, be placed in a coffin with strong disinfectants, and the coffin should then be tightly closed, and exposed to strong fumes of burning sulphur. Afterwards the body should not be exposed to view except through glass.

12. No public funeral should be held at a house in which there is a case of diphtheria, nor in which a death from diphtheria has recently occurred.

13. No child should attend the funeral of a person who has died from diphtheria.

14. Except under extraordinary precautions, there should be no public funeral of a person who has died from diphtheria.

15. The room in which there has been a case of diphtheria, whether fatal or not, should, with all its contents, be thoroughly disinfected by exposure for several hours to strong fumes of burning sulphur; and then, if possible, it should be exposed to currents of fresh air for several days.

To disinfect an ordinary room with SULPHUROUS ACID GAS: having tightly closed all the openings of the room, put live coals on top of ashes in a metallic pan, and place on the coals an iron pot containing sulphur in powder or fragments. Ignite the sulphur by means of an ounce or so of alcohol, or by live coals. To disinfect a hundred cubic feet of air requires the thorough burning of about one and one-half ounces of sulphur. A small room, ten feet by ten, and ten feet high, will require about two pounds of sulphur; and its complete combustion should be secured.

16. After a death or recovery from diphtheria, the clothing, bedding, carpets, mats, and other cloths which have been exposed to the contagium of the disease, should either be burned, disinfected as above, exposed to superheated steam, to a degree of dry heat equal to 240° Fahrenheit, or be thoroughly boiled.

PLAN FOR IMPROVED CITY BOARDS OF HEALTH.

One great obstacle to progress in dealing with preventable disease in the schools and out of the schools, is the inertia of established usages of the people and of local boards of health. In many places it has long been the custom for the successful political party to appoint a board of health, and to deny it money and other means for active work. Doctors and others have accepted the situation, and gone through a certain routine, which often has begun and ended with the abatement of a few nuisances, the making of a report of such feeble efforts, and then giving place to another board composed of new men from the same or from the opposite political party, which repeats the same old story. For any effective work for the prevention of diphtheria in the schools, indeed for any effective public-health work, it seems essential to have a new system of selecting local boards of health, and a new system of supplying them with the necessary money to carry on their work. Permit me to suggest a plan for the accomplishment of both these purposes, as follows: —

Let us suppose that the very able address recently given in this city by Mr. Edward Fenner, Vice-President of the New Orleans Auxiliary Sanitary Association, had been delivered before a "citizens' meeting" provided for by law, and officially called to consider the subject of municipal sanitation for the ensuing year, and to determine the amount to be raised by taxes for specified public-health service. Let us assume that, in connection with the address, there had been presented carefully prepared estimates of expenditures for each item needed during the ensuing year, and that the question before the meeting had been the fixing of those amounts. The character of the attendance at the meeting might not then have been very different from what it was, though the audience would probably be larger and contain a somewhat larger proportion of persons opposed to voting large sums of money; but there would then be

opportunity to meet that opposition face to face, and worthy objects would be likely to succeed. Let us suppose, further, that the local board of health to which was intrusted the expenditures of the money and the guardianship of the lives and health of the people of the city was of a kind essentially different from local boards of health heretofore established, — that it was not an ephemeral, political body, but a permanent board made a body corporate, and selected and constituted somewhat as follows : —

The board to consist of a convenient number of persons (perhaps one or two from each ward), whose terms of office shall be such that not more than half shall go out of office at any one time ; nomination to the office of member to be made by ballot at a citizens' caucus of persons belonging to the different political parties, and religiously pledged to the nomination of persons of both political parties in such a way that the board shall be equally divided politically, thus insuring freedom of the board as a whole from political control ; the board to choose its executive officers, whose services should receive sufficient compensation to enable them to do *constant* and effective work. Such a board of health to prepare the estimates before mentioned, to receive from, or order out of, the city treasury the funds voted by the citizens, and collected by taxation equally from all classes of people in the city (because all classes are benefited by the maintenance of public health) ; the board to be responsible directly to the people for its work, and unable to charge any lack of performance of duty upon any other body of men who might fail to give a board of health funds to do its work.

If any one supposes that this plan is fanciful and cannot be put in practice, I can assure him that it *can* be done, and HAS BEEN DONE for many years (about twenty-seven or twenty-nine years) with reference to a city board of education in Lansing, Mich. ;[1] and certainly no one will claim that the

[1] The mode of operation of the Board of Education in Lansing, which is proposed as suggestive of a plan for a city health board, is herewith appended : —

The Board of Education of the city of Lansing is composed of twelve members, two from each of the six wards of the city. One member from each ward is elected by the people annually at the regular charter election (in April). If a vacancy occurs during the year, the Board appoints some one from the ward in which it occurs to fill the vacancy until the next regular election.

By a long-established custom the Board is kept equally divided between the two leading parties, six members being Democrats, and six Republicans. Nominations to the Board are made by citizens' caucuses, called for the same evening in each ward by the Board of Education. At these caucuses one candidate is nominated for each vacancy, and always from the party to which the retiring member belongs. These caucuses are usually more fully attended by the members of the party to which the member to be elected belongs. Sometimes the attendance is very small, sometimes large. For years no candidate of a citizens' caucus has failed to be elected; and for seven years at least but two rival nominations have been made, and those were from the same party as the retiring member; and the persons so nominated were defeated at the polls.

The Board of Education controls the expenditure of all money received from the State, or raised by a tax by vote of the tax-paying electors, for school purposes. At the close of each year it determines by vote what sums are necessary to be raised by tax for the

subject of primary-school education is of greater consequence than that of an efficient board of health to guard the lives of those for whom the education is provided.

several funds, and submits these to a vote of the tax-paying electors at the regular annual meeting.

The following amounts were declared, by a resolution adopted Sept. 22, 1880, necessary to be raised by tax for the support of schools for the ensuing year, in addition to the one-mill tax and the primary-school money: —

Teachers' salaries	$7,002 95
Interest on bonded debt	3,840 00
Janitors' salaries	1,100 00
Fuel	500 00
Repairing school-buildings	700 00
Insurance	550 00
Supplies for schools	400 00
Contingent expenses	1,250 00
Library fund	100 00
Total	$15,542 95

This amount is about forty dollars less than that asked the preceding year. At the same time it was voted to submit a proposition to raise four thousand dollars, to build a new schoolhouse in place of the second-ward school-building, to the voters at the annual school-meeting to be held Oct. 12, 1880.

At the annual meeting of tax-paying electors held Oct. 12, 1880, the various items of the $15,542.95 asked for general purposes were voted on as a whole, and there was not a dissenting voice.

The sums asked by the Board of Education are usually voted by the tax-payers substantially as asked; sometimes slightly diminished, sometimes slightly increased.

The author of this paper respectfully suggests a comparison of such successful mode of securing means for effective work with the usual modes adopted for public-health purposes. It should be stated that Lansing is a city of between eight thousand and nine thousand inhabitants, and that its expenses for public-health purposes have not exceeded five hundred dollars per year. The writer believes, that, in every year, the lives of many children might have been saved by such means as have been pointed out in this paper.

VII.

THE DOMESTIC PESTILENCES VIEWED WITH REFERENCE TO THE SANITARY WARFARE AGAINST THEM.

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Secretary State Board of Health of New York.

During the past many years diphtheria, scarlatina, small-pox, measles, and puerperal fever have destroyed from nine thousand to twelve thousand lives annually in the State of New York, and probably not less than from seventy thousand to a hundred thousand in the United States. This sacrifice of human life occurs at the ages when it seems most precious and full of hope. This has been made by these few diseases which are widely transported and spread abroad by their specific contagia. However widely differing from each other, and spontaneous as each of the two first and two last mentioned may seem to be in their occasional outbreak, each of these five maladies ranks as a domestic pestilence.

It is for the reason that, as regards each of these destroyers, the infectious attribute which works the perilous effects that mark their progress is in every case propagated in enormous quantities by the suffering patient, and attaches to or permeates the fabrics and furniture of the sick-room, and especially all clothing and other textile materials which are upon, or in the presence of, the sick, that the expressive term "domestic pestilence" properly applies to them. Even to the least of these diseases, viz., puerperal fever, Dr. Oliver Wendell Holmes applied this title a quarter of a century ago. The terrible reality, and the poet-philosopher's manly and Hippocratic grasp of it, have insured such regard for the hygienic and ethical duties to woman in her maternity, that puerperal fever is held in check, though ever re-appearing from the causes that would be adequate to a perpetual repropagation if it were not treated in these days by every enlightened *accoucheur* as a domestic pestilence.

Several other diseases have their contagious factors, respectively; and, were the general dependence of the prevalence of them so nearly within control of physicians and sanitary officers that the medical and official duties concerning them could control or prevent their spreading a persistent propagation, then, certainly, should they too be in the same category as the few maladies to which we now invite attention. But while measles, whooping-cough, and typhoid fever do certainly spread by means of an infective factor, that infective attribute but furtively attaches itself to the sick-room, and it rarely

lingers long in one domicile. Yellow fever and typhus fix their deadly virus in closed apartments and in porous material, each in its own pestilent way; but we have no occasion at present, in the State of New York, to refer to them, except as the types of transportable fever-poisons.

Before discussing any points of sanitary practice concerning each of the four diseases we have selected for a special consideration, there should be clearly determined in every medical and official mind some of the conditions under which both the medical and hygienic doctrines, rational practice, will be found to depend. We have to take notice of certain essential and accepted facts in the etiology, and, indeed, in the pathology, of each of these maladies, in order to find and define a general principle of medical and sanitary procedure for the repression and prevention of the controllable causes of them. Under this head we have: —

First, In the natural history or ætiology of each of these, as in many other infectious diseases, the admitted fact is, that, so far as the present state of our knowledge of causation of them is concerned, each of them may, and sometimes does, appear without any known or even suspected dependence upon any other individuals then or recently sick with the same malady; and yet, that, as respects small-pox, no physician or naturalist doubts that the virus of a person sick or dead with small-pox is in every instance the inevitable and only cause of each case of that malady. It is almost as firmly believed by accurate students of disease and of natural history that scarlatina equally depends upon antecedent cases of that disease; but, for practical uses of sanitary science, it is not necessary to even presume there is such a dependence invariably: while, as regards puerperal fever, even when most specifically infectious and fatal, it is a fact beyond dispute that initial cases do occur, from inflammatory and septic causes, which, from their aucthonic development into a malignant infective virus, begin and spread the fatal child-bed fever. Probably few *accoucheurs* and physicians in general hospital or surgical practice will dispute, that, in the septic poison of erysipelas and some other maladies, the inoculation and septic transmission may and does extend to the mother, in the early hours or days of maternity, the virus, which in and by her, becomes the infectious poison of puerperal fever. But, more than this, as regards the septic contagia in the period of maternity, how often does the endometritis, or the pelvic inflammation of woman after child-birth, eventuate in a transmissible puerperal infection. The specific quality and line of perpetual, or at least continuous, contagious propagation of the puerperal infection, and probably certain other infective maladies, seem to be imparted in some sense by the medium of tissues, — *soil,* as we may say, — in which a certain specific character is acquired. Dr. Burdon Sanderson's experiments show that the development and intensity of the infective attribute may, in particular lines of perpetuated infective virus, be regarded as a concomitant, if not a result, both of *intensity,* and *products* of destructive inflammations.[1] Mr. John Simon's words on this

[1] See reports by Dr. Burdon Sanderson and John Simon, Blue Book, Public Health Reports, new series, No. VI.

point are emphatic. He says, "Dr. Sanderson has found that inflammations, in order to be most formidably infective, *need not have been first started by contagion* from any pre-existing case of like sort, nor by any immediate inoculation with foreign putrid matter, but might, it seemed, be highly infective merely in accompaniment of being highly *intense*. . . . And Dr. Sanderson has now succeeded in clearly showing that it is a quality which may be artificially cultivated; and that, starting from purely chemical lesions, it may be developed in higher and higher degrees, by successive inoculations, until there presently results one of the most tremendous morbid poisons which the mind of the pathologist can conceive."

We have to admit that morbid poisons may be cultivated up to a terrible degree of infectiveness, and that particular tissues, and more especially the blood itself, may offer opportunity or field for specific manifestations of fatal disease, as in the puerperal fever, etc. It is not improbable that in diphtheria and scarlatina of the malignant types there may be a superadded virulence, because of the special infectiveness incident to the malignancy of cases from which the spreading of the malady begins, or because of special morbid conditions pre-existing or arising in the victims of the malady itself.

But whence the initial cases of diphtheria and scarlatina came, and how and where the specific contagium was sequestered and set afloat so as to give the apparently new point of departure for the specific disease, who shall reveal? For the present we have to accept the fact of these *initial cases as a first truth*, while few of us doubt that every such *initial* case actually depends upon some previous case.[1] But sanitary duties begin with the initial cases, and they must never be relaxed until all propagation from such cases terminates.

Second, The commencement or outbreak of single or initial cases of any of the domestic pestilences, just as in the occurrence of initial cases of any local or any pandemic infectious disease, must be regarded as the time and the place for instituting systematic sanitary and medical duty for suppressing the extension and activity of the portable infective attributes of the malady, and of removing or neutralizing all contributing causes of infection. For the question is, how to remove combustibles and extinguish the fire at once; and not, how — possibly — did the fire originate.[2] The infective factor is not to be disregarded simply because, like the wafted thistledown, the very winds may bear unwelcome germs. All germinal sources of disease that chemistry and cleansing can attack, must be controlled or destroyed.

Third, There is much and very significant evidence that the degree of malignancy and the tendency to rapid, virulent, and epidemic spread of each

[1] In 1858 the writer presented to the State Medical Society a specimen of the then unrecognizable cryptogamous plant which had sprung up upon a chronic ulcer in a patient of Dr. J. E. Hawley of Ithaca. It was a fungus of rare beauty of coloring and form. Professor Torrey at last discovered it to be a *phaloidei* fungus, whose habitat is in Bengal or Java.

[2] The gentlemen who believed it might be a spontaneous evolution might also have believed, with Florence Nightingale, that small-pox is an evolution of filth.

of the domestic pestilences depend in some measure upon accumulative or active infectious elements, whether germinal or otherwise virulent, together with other factors of causation which admit of human control; while whatever be the agencies which do not admit of such control, and yet facilitate the propagation of these diseases, they can be neutralized as regards any power to propagate the diseases attributed to them. Whoever holds the old fatalistic views, or becomes a pessimist in ætiology or hygiene, will do no masterful service for the public health.

Fourth, The best experience, and all that science can at present explain and apply in practice, fully support the opinion that the infectious factor of each of the domestic pestilences is greatly aided and intensified in its action by local, personal, and atmospheric conditions which are recognizable and controllable.

Fifth, That the sanitary control of these maladies necessarily comprises the suitable treatment of these tributary causes, and that no preventive and protective measures are adequate unless they control the factors of causation.

Sixth, The prophylactic *individual sanitation* may largely enter among the general means of protection of the public health; and, as regards small-pox, the protective effect of vaccination is the supreme example of such individual sanitation. In the near presence of scarlatina, diphtheria, and puerperal fever, the individual sanitation is not in vain.

Proceeding now from these postulates, which sufficiently enunciate the grounds of sanitary warfare against the destroyers we have enumerated, what do we see most important in the history and habits of each of these five maladies?

Diphtheria. — An old enemy that did fatal damage in various portions of the United States soon after the war of Independence, re-appearing in nearly all the Northern and Western States in 1858–61, and soon spreading over the entire continent, so that for twenty years past it has almost equalled scarlatina, in its fatal ravages.

Dr. Sylvester Willard's account of diphtheria, as it prevailed in the city of Albany in 1858, showed how strangely it elected the half of the city south of State Street, but failed to define any local or domestic sanitary reasons why State Street was then the bisecting line between the regions of general prevalence and rare occurrence. Who will define the reasons?

At the same time that the city of Albany was suffering, a few hamlets in Western Vermont became alarmed by its prevalence; the most distant new settlements of Minnesota, even up at Manikato, were smitten by it; and, while it appeared among new settlers and in scattered groups of families, it was very malignant and infectious.[1]

In the city and vicinity of New York this malady crept very slowly forward from 2 fatal cases in 1857, 5 fatal in 1858, 53 in 1859, 415 in 1860, 429 in 1861, 586 in 1862, 944 in 1863; and up to the end of 1873 there had been

[1] See Seventh Report State Board of Health of Minnesota, Dr. Staples's Report on Diphtheria.

7,185 deaths charged to it. In 1874 there were 1,665 fatal cases in the city; 2,329 in 1875, 1,750 in 1876, 951 in 1877, 1,007 in 1878, and 671 in 1879.

The most opulent and best housed suffered heavily, but the new tenement-house districts north from Fourteenth Street suffered most. The entire regions which are underlaid by the elevated and deeply eroded rock, the shallow-covered face of which is but a series of undrained but seductively covered bowls, the soil being saturated even at the highest levels of the city, on all sides of the Central Park and for a mile and a half south of it, have suffered most persistently and fatally from this disease, while the lower districts, south of Houston Street, have suffered least, though most crowded and most unhealthfully domiciled. Local conditions have certainly had to do with this twenty-two years' experience of diphtheria in the city of New York.

Certain Local Conditions under which Diphtheria has proved excessively Malignant and unusually Contagious. — In the course of a protracted inquiry upon this subject, the writer has noticed, that, among other important conditions, the following are obviously most essential for sanitary treatment: —

1. Permanent wetness of grounds, especially when resulting from nearly superficial underlying impervious clay or other subsoils, or rock and rocky bowls (basins), wet cellars and basements, stagnant streams, and saturated grounds of neighborhoods, or surrounding the dwelling-places.

The testimony on this subject is remarkably instructive in all regions of country where the natural history of diphtheria is well reported. The observations of the writer in several States of the Union warrant the foregoing expression of a general fact.

2. Great sanitary neglect in particular habitations and families in which diphtheria becomes prevalent, and from which it spreads in a malignant form; sometimes entire neighborhoods in which such neglect prevails, especially in regard to cleanliness and ventilation of dwellings and of sick-rooms and closets, and to cellars especially; the filthy neglect of excremental outflowings, and of clothing, bedding, and utensils used by the sick.

3. Foul water-supplies and an impure local atmosphere, acting as aggravating causes of malignancy of the infection.

Certain Personal and Domestic Conditions which facilitate the Propagation of Diphtheria. — These we may enumerate as follows: —

1. Failure of the family, the physician, the nurses, and the community generally, to regard and treat the presence of diphtheria as a self-propagating malady, and especially to regard and sanitarily treat all outflowings and excreta from the patients as contagious, and requiring immediate and effectual disinfection.

2. The failure to organize all nursing and personal attendance of the sick so as to exclude all who are not employed under medical or sanitary supervision for the care of the patients and all that pertains to them; in other words, the want of central and effectual sanitary advice concerning the sanitary care of the sick and of infected premises.

3. Failure to effectually disinfect the entire premises, and all material of the domicile where there has been diphtheria.

4. Failure to recognize and act upon the medical fact that persons convalescent from diphtheria may communicate infection of the malady several weeks after recovering from the sick-bed, and during their gradual convalescence.

5. Failure to advise and procure the adoption of adequate means of personal sanitation and prophylaxis throughout the communities exposed or near to cases of diphtheria, especially as regards the throat and lungs, and the maintenance of the most healthful condition possible of the *primæ viæ;* such measures being protective of individuals, and hastening the termination of an outbreak. This remark applies, *first,* to all in attendance upon and nearest to the sick; and, *second,* it applies to all in the region where the disease has appeared.

Scarlatina. — As this disease destroys the largest number that perish from any contagious fever in our country, and in the State of New York alone causes from three thousand to five thousand deaths annually, it is of the utmost importance that the true doctrines and the best sanitary practice should prevail in regard to it. Until within twenty-five years there were many physicians and some teachers who scorned the doctrine of infectiousness and a corresponding sanitary surveillance of scarlatina. The true sanitary doctrine and a saving method of care and treatment now prevail.

The ætiology of scarlatina, though still a mystery, is no more indefinite and obscure than that of typhus or of the enteric fever. The intimate pathology of it certainly unfolds terrible realities of histological disturbances; those of the skin, the mucous membrane, and of the renal structure, being very grave. The purpose of this paper being to take note only of such facts as directly aid in the warfare that should be waged against the diseases herein mentioned as destroyers, we notice, that, as regards scarlatina, the skin and all the organs of excretion undergo such histological disturbances and throw off such materials as may reasonably be presumed to convey an element of infection.

The fearful damage which scarlatina inflicts upon those whom it does not kill, makes this the worst of all infectious maladies; for from forty-five to sixty-five per cent of all who convalesce are believed to suffer consequences of the malady that permanently impair the soundness and value of life. In the pathological researches of Klein, under the chief medical officer of the Privy Council of England, in the field of histological alterations which rapidly ensue upon scarlatina, these textural and morphological changes are proved to be of a most serious and alarming kind. What had long remained mysteries of the pathogenesis of scarlatina became matters of recognizable peril and profound concern in regard to the tendencies of morbid changes wrought by the virus of this malady. Mr. John Simon remarks concerning the facts already ascertained, that "Dr. Klein seems to find that scarlatina tends to produce widely diffused textural changes in the walls of blood-vessels, — a hyaline swelling of the texture of capillary vessels and the inner surface of minute arteries, and also an abundant growth of new elements in the contractile layers of the arterioles; changes which may, of course, be productive of other lesions." [1]

[1] See Report No. VIII., 1876, pp. 2 and 3, and 23–91, New Series, Medical Officer of Privy Council.

Whatever the germinal or infective virus of this malady may be, the morbid changes induced by it are rapid and profound; and in the intensity of this operation of the morbid poison of scarlatina are found ample reasons for seeking by all possible means to mitigate the disease in all who are in any manner exposed to it, and even to postpone and evade the attack by it. The perils are so great that the avoidance of it altogether or for the longest possible period seems a duty. But in the presence of scarlatina the first duty of families and individuals is that of most faithful sanitation in order to be prepared for an invasion by the infection; and, as regards the sick and convalescent, no necessary means should be wanting to give all available sanitary and medical resources for the prompt and complete disinfection of the surface of the body and all the excremental matter, the sick-room and all that pertains thereto: for in no other disease, except small-pox and true typhus and the relapsing fever, do emanations from the sick and their excreta have such infective intensity and permanence.

Dr. Budd of Bristol, whose lamented death occurred only a few months ago, has carefully formulated a sanitary preventive code for physicians and families in the presence of scarlatina, the substance of which we append to this paper; for it embodies the very best lessons from large experience of a masterly physician and hygienist. There is much implied in regard to medical and sanitary duties when he says, "For a period of nearly twenty years, during which I have been employed in a very wide field, I have never known the disease to spread in a single instance beyond the sick-room, and in a very few instances within it." Would that we could all speak thus! Does not our partial trial of such a sanitary code in private practice, and in the army experience, and the service of charitable institutions for children, warrant the conclusion which Dr. Budd reached in the cities of Bristol and Clifton?

In thus recognizing for a moment a few of the facts which, in the pathogenesis of scarlatina, must not be overlooked by physicians who would attempt by hygiene to mitigate and measurably control this malady, we do not here discuss the vexed questions of a germ theory. We simply notice how profound the disturbance of textures, and how necessary the medical and sanitary control of all who are sick with scarlatina, and of all outflowings and emanations from them; for those facts that are now comprehended in the histological alterations and morbid effects of this virus impress a terrible certainty upon the ground of our belief, from observation alone, that not only is scarlatina the most subtle and widely multiplied and evolved of all morbid poisons that ever invade the human body, but also that no ordinary attentions to the sick, no ordinary precautions of attendants, and no ordinary cleansing and disinfection, can with certainty control the contagious factor by which this malady is propagated. The prophylactic sanitation which is indicated by all that is now known in the ætiology and pathogeny of this all-pervading disease may ere long aid in subjugating it, hopeless as this task may have seemed; for to limit the intensity and destructiveness of such a virus and its operations, and to be ever mindful that scarlatina, instead of being a mere "rash," is a most all-

pervading poison, which seizes upon every vital texture, and repropagates its own virus in force and kind, that may be spread wherever there are carriers, living or inanimate, to bear it away from the patient and the sick-room; also, that in the long period of convalescence of those who survive, and even in the remains of the dead, this subtle poison is present, and puts in jeopardy the community. Disinfection, methodical sanitary regulations affecting every sick-room, every case of scarlatina, every attendant, and every household where the sick or dead are, and even regulations for sanitary care of the dead and their burial, are now proved to be among duties of the highest order ever imposed on physicians. Every case of the malady is supremely important; every visit and act of the medical attendant is in the name of Hygeia, even though the Healer were presiding: for all the resources of protective medicine are to be commanded and applied by him. He may not in all places and under all circumstances be able to set absolute limits to the farther spread or to the destructive intensity of the disease; but when all physicians and all the people do with promptness, and to their utmost, all that medical and sanitary science require, there must be a vast mitigation of the destructive course of this invader of homes. This sanitary conquest, which has become possible, can only be achieved by the most enlightened, precise, and quite general efforts of medical practitioners. Each physician will find his reward, as Dr. William Budd of England did, in his own experiences, from his sanitary success in the households where he commanded all the desired resources for sanitation; and in the many habitations where crowding and poverty, ignorance, indifference, and uncleanliness, or an epidemic and accumulated intensity of the infectious cause, prevail, the best skill and sanitary service of the medical attendant and the health officer will fall short of the visible conquest of every boundary of the invaded field. With true scientific faith and practice, no physician or health officer will fail to deserve, and very largely to win, the success for which the ten millions of families in the United States now plead in this warfare against scarlatina.

Precisely what the sanitary methods against this disease should be, we can, perhaps, best express by a brief recital of those which Dr. Budd entitled, "The physicians' code of sanitary procedure in scarlatina."

AN ABSTRACT OF THE "PREVENTIVE SANITARY CODE AGAINST SCARLET FEVER."

. . . "Much more can be done to limit the spread of this malignant disease than the public are at all aware of, or than the common practice would seem to indicate. . . . The eruption from the skin, every thing that is shed from the body of the infected, the discharges from the throat and nose, those from the bowels and probably those from the kidneys," Dr. Budd treated as sources of infection. "Taking these things as our data, the one thing to aim at, therefore, in seeking to prevent the spread of this fever, is to annihilate the germs proceeding from these various sources on their very issue from the body. . . . I have long been in the habit of enforcing the following simple precautions: —

"1. The room in which the patient is detached is dismantled of all needless woollen or other draperies.

"2. A basin, charged with chloride or carbolate of lime, or some other convenient disinfectant, is kept constantly on the bed for the patient to spit into.

"3. A large vessel containing water impregnated with chlorides or permanganates always stands in the room for the reception of all bed and body linen immediately on removal from the person of the patient.

"4. Small pieces of rag are used for wiping the mouth and nose. Each piece on being once used is immediately burned.

"5. As the hands of nurses and the medical attendant of necessity become frequently soiled by the specific excreta, a supply of towels and two basins, one containing water with permanganates or chlorides, and another plain soap and water, are always at hand, for the immediate removal of the taint.

"6. All glasses, cups, or other vessels, used by or about the patient, are scrupulously cleaned before being used by others.

"7. The discharges from bowels and kidneys are received, *on their very issue from the body*, into vessels charged with disinfectants." [1]

Dr Budd applied his prevention code with such thoroughness as to enable him to say, that, in his hands, in a large practice in the city and environs of Bristol, it gave the immunity and entire control he sought by means of it. The details, as filled up and applied in his practice, are simple but absolute. They comprise, —

Isolation, prompt and complete, with a safeguard over the nursing and other attendance;

Disinfection, positive, and applied to every thing that could be presumed to retain or imbibe the contagium;

Cleanliness, most scrupulous and universal, and the burning of whatever could not at once be cleansed;

Ventilation, abundant and ceaseless;

Anointing the body of the sick, to prevent escape of any particles of infected epithelium from the surface of the body; beginning this duty as soon as the efflorescence appears, and continuing it twice daily until the desquamation ceases;

Destructive disinfection of excreta from the sick and convalescent, and the disinfection of sewers and drain-pipes connected or near to the house where the sick are;

Disinfection of the dead, and the forbidding of assemblages and exposure before and at the burial.

Dr. Budd found it so difficult to carry his views of duty into full effect in the tenements of the poor and ignorant, that he was led to say, from experience, that "the conditions which are denied in the houses of the needy should always be at hand in the fever hospital." In every crowded community, even in a factory village, a summer resort, or a school, when scarlatina appears, this sanitary code of preventive and precautionary measures should be most faith-

[1] See Rules for Disinfection.

fully carried into effect, though an entire floor or a separate cottage may have to be taken exclusively for hospital use. Every city in which are great numbers of multiple dwellings or tenements should have a fever-hospital arrangement, no matter how limited and unpretending, if it only be upon a model plan in the sanitary sense.

Two questions only are before us in the presence of small-pox: —

First, How shall the patients and all that is infected by them be so isolated and treated as wholly to prevent the spread of the disease to others?

Second, How shall the necessary amount of vaccination and revaccination be applied in the exposed community?

First, Every physician, and, for like reasons, every citizen and householder, is responsible to the extent of authority and influence he can in any manner exert for the immediate and complete isolation of the patient, and all that is infected with small-pox. Experience shows that this duty warrants the exercise of such influences and the use of such language as imply the right and obligation to command. The kindled blaze that is leaping up to the combustible tenement dwelling, or in the hallways of an assembly-room, permits no bystander or official "to stand upon the order" of his going, but requires him to "go at once" for the control and extinction of the spreading flame. All communication between the flame and the combustibles should be cut off instantly. The next procedures become official and medical, and for these there needs be as perfect a preparation and medico-official readiness and outfitting as the city ever organized to extinguish conflagrations. The duties become strictly medical; and, as Mr. Simon once said of these medico-official acts, "what has to be administered is not a mechanical matter of routine, but a system, which, from beginning to end and from centre to circumference, requires in all its parts to be vitalized by the science of medicine." The details of these duties are already fully agreed upon; and the only question is, How shall the ways and means be ordered and ever ready?

Puerperal Fever. — As all physicians now recognize the perilous facility with which childbed fever propagates itself from mother to mother by the simple agency of the professional attendant, the chief question of sanitary practice relates to purification and disinfection as respects the patient and all that pertains to her and the maternity chamber, and as respects the *accoucheur* and other attendants. There is a special necessity laid upon these attendants for subjecting themselves to a voluntary quarantine as regards all and any kinds of exposure of any other mothers at the time of *accouchement*.

The purification and disinfection of the lying-in chamber and lying-in ward are never too effectual; and we venture to say that this remark will apply to the mother herself.

OUTLINE OF SANITARY REGULATIONS FOR CONTROL OF THE DOMESTIC PESTILENCES.

The Patient. — To separate the sick and all infected materials so that no person who is susceptible to the malady shall be in any way exposed thereto, unless necessarily so in the required attendance. The highest well-ventilated

rooms are to be preferred. All upholstered and stuffed goods and carpets should be removed; and no needless clothing and materials that cannot be readily washed, boiled, or destroyed, should be permitted in the sick-room.

No persons, except those who are necessarily in care of the patient, should visit or remain in the room. If there is an open fire-place, keep a little fire in it. Maintain perfect ventilation by open windows and the open flues.

The contaminated or exposed clothing and materials should be treated as though known to be infected. They should not leave the apartments devoted to the sick until all have been disinfected. All kinds of excremental matters from the patient should be disinfected as soon as voided.

The patient, at all stages of the sickness and during the entire period of convalescence, should be regarded as liable to communicate the infection to susceptible persons. Especially is this true of diphtheria and scarlatina. Experience proves, that until the skin, and even the mouth and throat, are restored to a healthy condition, the convalescent from these diseases seems to be liable to impart the infection to other persons.

Notice to Neighbors, when any one of the generally contagious maladies occurs in a house, is an imperative duty.

Disinfectants, and how to use them. — The instructions issued by the National Board of Health at Washington are the most economical and easily followed. They have been adopted in lieu of all others by the State Board of Health of New York, and have been officially promulgated in Brussels and some other foreign cities. Being brief and rational, we append them here: —

INSTRUCTIONS FOR DISINFECTION.

Disinfection is the destruction of the poisons of infectious and contagious diseases.

Deodorizers, or substances which destroy smells, are not necessarily disinfectants; and disinfectants do not necessarily have an odor.

Disinfection cannot compensate for want of cleanliness nor of ventilation.

I. DISINFECTANTS TO BE EMPLOYED.

(1) Roll sulphur (brimstone) for fumigation.

(2) Sulphate of iron (copperas) dissolved in water in the proportion of one and a half pounds to the gallon: for soil, sewers, etc.

(3) Sulphate of zinc and common salt, dissolved together in water in the proportions of four ounces sulphate and two ounces salt to the gallon: for clothing, bed-linen, etc.

II. HOW TO USE DISINFECTANTS.

(1) *In the Sick-room.* — The most available agents are fresh air and cleanliness. The clothing, towels, bed-linen, etc., should, on removal from the patient and before they are taken from the room, be placed in a pail or tub of the zinc solution, boiling hot if possible.

All discharges should either be received in vessels containing copperas so-

lution, or, when this is impracticable, should be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution.

Unnecessary furniture, especially that which is stuffed, carpets and hangings, should, when possible, be removed from the room at the outset; otherwise, they should remain for subsequent fumigation and treatment.

(2) *Fumigation* with sulphur is the only practicable method for disinfecting the house. For this purpose the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans supported upon bricks placed in wash-tubs containing a little water, set it on fire by hot coals or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionally increased quantities.

(3) *Premises.* — Cellars, yards, stables, gutters, privies, cesspools, water-closets, drains, sewers, etc., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containing about sixty pounds of copperas in a barrel of water.

(4) *Body and Bed Clothing, etc.* — It is *best* to *burn* all articles which have been in contact with persons sick with contagious or infectious diseases. Articles too valuable to be destroyed should be treated as follows: —

(*a*) Cotton, linen, flannels, blankets, etc., should be treated with the boiling-hot zinc solution; introduce piece by piece, secure thorough wetting, and boil for at least half an hour.

(*b*) Heavy woollen clothing, silks, furs, stuffed bed-covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, their surfaces thoroughly exposed, and pockets turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.

(5) *Corpses, especially of persons that have died of any infectious or malignant disease,* should be thoroughly washed with a zinc solution of double strength; should then be wrapped in a sheet wet with the zinc solution, and buried at once.

Metallic, metal-lined, or air-tight coffins should be used when possible; certainly when the body is to be transported for any considerable distance.

VIII.

DENGUE.

By J. G. THOMAS, M.D.,
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SYNONYMS.

This disease has been known by many names. With the exception of "break-bone fever," as far as can be ascertained, the first name given to it was by the negroes of St. Thomas, who christened it "dandy fever" in 1827. When it first made its appearance on that island, about 1824, it was with some reason supposed to have been brought over by a cargo of slaves from the western coast of Africa, and for a time was called African fever; but after 1827 the appellation given by the native negroes gained the ascendency. The term by which it is now known, and which is used by the French, Germans, Italians, and English, and which was accepted by the committee on nomenclature of the Royal College of Physicians and Surgeons of London, it first obtained in Havana in 1828. Writing for "The Boston Medical and Surgical Journal," Oct., 1828, Dr. Osgood says, "a new disease" has broken out in Havana, which the Spaniards have called "*el dengue*," which means literally "affectation," and which, it will be observed, implies the same idea that prevailed in the minds of the negroes the year before at St. Thomas. This is the term by which it will be known in history; and as it was accepted by the College of Physicians and Surgeons of London, who have made the most successful effort to correct the confusion of terms which every accurate physician has felt exists in our nosology, so it should be the one used by all the profession, and the laity will soon adopt it. "Break-bone fever" is one of the oldest as well as one of the commonest names by which it goes, especially in this latitude; and it may well be doubted if it is ever completely divorced from it, for it describes a symptom far more common in the malady than the one given it by the West Indians. In fact, it is only now and then that we see a case which illustrates the appropriateness of the terms "dandy" or "affectation;" but still they do occur. There are a large number of cases, which, though they are quite painful and severe, yet do not always put an energetic man in bed; and, as he walks around when certain muscles of the back, loins, and hips, are attacked, it gives to the whole body and limbs a peculiar stiffness and constraint in motion, which recalls the aptness of the name given by an ignorant people.

It has been suggested to Latinize the word "dengue," and call it *denguis;* and this term has been made use of by a few authors.

Aden fever is a name that was given it in Calcutta, because it was supposed to have been imported from Aden in Arabia.

In Mecca, where it was carried like cholera by the wandering Mussulman in 1824 and in 1870, it was called *aburunka-bah*, which means literally the "father of the knee," and applied to the disease from the great pain it often produced in the knee-joint.

It has gone by the name of "scarlatina rheumatica," which would appear to confound it with two of the oldest and best-studied diseases. Likewise it has been called by several compound names similar to the latter, such as "eruptive articular fever," "eruptive rheumatic fever," "eruptive epidemic fever of India," and "broken-wing fever."

In the south of India it was called *mudak-mariata*, which is said to be a Tamil word, and derived from the two words,—*mudak*, which means contraction or stiffness, and *mariata*, the name of an idol or Hindoo deity.

NOTES ON ITS HISTORY.

We only have to go back a little further than a half-century to find the first authentic record of epidemic dengue. It is true that Dr. Wood of Philadelphia thought that Dr. Rush had described it as epidemic in that city in 1780. I believe that Dr. Rush called the malady he was then meeting with "bilious remittent fever;" and while we find, in looking back, diseases have not always been named or classed properly, and candor compels us to admit that our discrimination in diagnosis has not always been equal to the occasions when new disorders or symptoms develop themselves, yet we are compelled to consider that Dr. Rush must have seen bilious remittent many times before, and that he was only meeting with a familiar disease, perhaps somewhat altered in type. It is not easy to credit that one so gifted by nature as he was, and who had cultivated his fine practical perceptive powers to such a degree, could have failed to have discriminated between an epidemic of dengue and bilious remittent. Possibly we may have to modify our views in this regard; for it is conceded that yellow fever has been mistaken for bilious fever, and bilious fever for yellow fever, at a much later date than that of Dr. Rush's observations. In passing, and as pertinent to this point, I have not the positive proof to assert it, yet I have the strong conviction that dengue has prevailed to a limited extent in many localities in the South in the summer of 1880, where it was not recognized as such.

Gabert described an epidemic fever which prevailed in and around Cairo, Egypt, and which has been supposed to have been dengue, though it has not been accepted as authentic; and yet it may have been, for it certainly prevailed there several times later, notably in 1870, when it was thought to have been imported from the direction of Mecca, Aden, and Zanzibar.

The same doubt is thrown on the description of an epidemic given by Pezet as having prevailed in Lima, Peru, in 1818. There are accounts which must be believed that it was prevalent in 1824 in some of the West Indies. Dr. Copeland says it appeared first in epidemic form in Rangoon in 1824, and thence spread widely over India in 1825.

When the disease appeared in Charleston, Savannah, and other Southern

cities, in 1828, Dr. Waring, according to Dr. Dickson, thought that it was the same disease which had prevailed at Savannah in 1826, and which was called "break-bone fever." Dr. Dickson seems to doubt the identity of the two epidemics. The inference to be drawn from Dr. Dickson's writings is, that he believed that the true eruptive dengue never prevailed in any of the Southern States until the latter part of the summer of 1828. I am not aware that any other writer upon the subject, of so much repute and accuracy, ever questioned the fact that what was called break-bone fever in Savannah in 1826 was the same malady which had swept over the West Indies in 1824. It is believed by some to have prevailed in more than one of the Southern States as early as 1824 and 1825; and admitted by all to have been generally prevalent in 1828, when it seemed to have disappeared until 1848–50.

Pazzio, who published an account of an epidemic of dengue as it appeared in Cadiz in 1871, says a similar one prevailed there as well as at Seville in 1764–68, and that its origin was traced to Africa.

In 1780 the native population on the Coromandel coast were attacked by a fever which resembled dengue in more than one particular, but especially in the fact that all were affected, and there were no deaths. It prevailed on the western coast of Africa, at St. Louis, Senegal, and at the island of Gozee, and also at the Canary Islands, in 1845–48, 1856, and 1864.

Dr. Mellis, Dr. Charles, Mr. Verchere, and Mr. Sherriff trace the epidemic in India of 1824 and 1870 directly to Aden, and from thence to Zanzibar. Thus it will be seen that most of the accounts that we get of the early appearance of this disease point in the direction of Africa. It may be said that dengue has prevailed in India, Burmah, Thibet, Arabia, Egypt, and other parts of Africa, North and South America, and in the south of Europe.

Dr. Golding Bird, we believe, was the first to suggest that some cases of disease, described by Dr. Richardson in London as scarlet fever combined with acute rheumatism, were perhaps dengue. This is the only intimation that I can find of its appearance anywhere in Europe, other than those mentioned in the south of Spain.

ÆTIOLOGY.

The specific cause of dengue, like that of yellow fever, cholera, epidemic influenza, etc., continues beyond our reach. As yet the most powerful microscopes, combined with the most delicate chemical tests, have failed to give us perfect results, in seeking for the essential germs of each one of them. Whilst we know from their laws that they all have their own specific seeds, and we have often heard the cry of "Eureka," yet up to the present time we have had to content ourselves with the study of the secondary or developing influences, and upon these lines we have an array of accumulated facts, and are progressing every day.

That dengue has its own specific germ, which seems to operate when in the human system in a specific manner, admits of little doubt; and that it is susceptible of transportation and is in some degree infectious, its history

seems to sustain. It appeared in Zanzibar in July, 1870, and from thence followed the coast of Africa, and was imported into Aden by the ship "Somalis." From Aden it followed the Arabian coast up to Mutha, where it developed into an epidemic in 1871. From Aden also it appears to have been carried into Bombay and Calcutta by the shipping-trade. In both of these places, when it first made its appearance, it prevailed almost entirely for a time among the Jewish part of the community, and they were known to have the closest commercial relations with Aden.

But the free communication which existed between Aden, Bombay, Conamara, and Calicut, was supposed to be the means by which the disease was spread from one place to another. Moodeen Sherriff, surgeon of the Triplicaine Hospital, Madras, says the troop steamers "Jumna" and "Dalhousie" conveyed the dengue from Aden to Bombay and Conamara in the latter part of December, 1871; and about the beginning of 1872 the disease made its appearance in Bombay, Poona, Conamara, and from the two first-named places it was carried all over India by railways.

Dr. W. H. Cock, in "The Edinburgh Medical Journal," 1830, gives an account of an epidemic of dengue at the island of St. Bartholomew, West Indies; and he adduces an instance, where, on the neighboring island of St. Christopher, the disease was entirely unknown, when three persons went down to St. Bartholomew by the sloop "Maxwell," where the disease was prevailing, and carried it back to St. Christopher, and it spread all over the island. Such are a few of the fairly established instances of its portability by land as well as by sea. I venture the remark, that, if dengue was attended with the same fatality as cholera or yellow fever, its transportability would be established as well as either of them. Whether, after it has once prevailed in a place, it ever becomes in some degree naturalized in an endemic form, and under favorable circumstances susceptible of acquiring epidemic exaggeration, and thus becoming a true travelling epidemic, moving on by communicability through human intercourse, remains to be solved. For, certainly, a like question has been before the profession for a long time in respect to one of the most pernicious disorders, without satisfying the minds of every one.

When dengue made its appearance in Savannah in the early part of August, 1880, and gradually spread over the entire city, assuming the most intense epidemicity, these questions were constantly revolving in my mind. After the most diligent investigation under the circumstances, I came to the conclusion that it would be impossible to prove that it was brought here, except perhaps by inference. It certainly was prevailing in our neighboring city of Charleston some weeks before the first cases were reported in Savannah, and there was daily communication between the two places. Whether, therefore, it originated here this year, or crept noiselessly in, by railway or sea, I will not pretend to say; though I do not hesitate to repeat that my view of the nature of the disease forbids the idea of its springing up *de novo*. That the germs of dengue have slept over in Savannah from 1850 to 1880, or that the disease has occurred here in sporadic form from 1850 to 1880, springing into epidemic

activity in the latter year, I do not believe; and, while my experience may not accord with that of others having equal opportunities for forming an opinion, yet I must say, that during a practice here of sixteen years I am not conscious of having seen the true dengue until 1880. In order to endeavor to settle some of the points above alluded to, on Nov. 13, 1880, I addressed a circular to all the physicians of Savannah, containing certain questions to which I requested answers. One of those questions was, "Whether they had any facts bearing upon the origin of dengue here this summer." Another was, "Whether they had any theory with reference to its origin." These questions were sent to about twenty-nine physicians. Nineteen or twenty replied. Of these, there were three or four whose answers led me to suppose that they believed it was due to malaria, and that the disease was nothing more than a form of expression which our fall fevers had assumed. More than two-thirds of them replied, that they had neither facts nor theories with reference to its origin. One answered, that he had no facts bearing directly upon his position, but that his theory was that it was brought from Charleston.

IS IT INFECTIOUS?

I must say, in discussing this point, that while I have seen many instances where infection would have been expected, and where none occurred, yet daily observation for several months has impressed me with the idea that it may be infectious, and at times propagated by human intercourse. I have thought, that if its course could be narrowly watched after it enters a place, that its gradual spread from one block of buildings to another would be discovered. It certainly was the case, that, in most instances, after attacking one member of a household, in a few days the others displayed some symptoms of the disease. An instance came under my immediate observation, where a gentleman, who had been in town for several weeks, went to the country, and had the disease. His wife nursed him there through it; and, upon his recovery, she came in town with him, and was seized with it within a few hours after her arrival. There is certainly much in the history of dengue which goes to establish presumptive evidence of its infectiousness. In India this theory has been strongly maintained by the majority of the authors that I have been able to consult. Mr. Sherriff says, "that it is highly contagious, and, in this respect, it exceeds small-pox, measles, and all other eruptive diseases." Surgeon Verchere, who was in charge of Fort William, where there was stationed a force of European troops, says, that the only way he could account for the great discrepancy in the number attacked among the privates and the officers, was, that the men in the line, when seized with the disease, were at once removed to the hospital, and taken away from contact with their comrades; whilst, on the other hand, the officers, when they took it, remained in their quarters, and were constantly visiting each other. He goes on to say that it was the same at the Hastings barracks, where he also was in attendance, and that there the people nursed each other, and the percentage of cases was very high; that all the hospital assistants, medical students, and hospital servants had the disease.

He asserts that the evidence was undoubted, that communities suffered in proportion to the extent to which they were exposed to the infection. From more than one source we gather, that in India it attacked all races, classes, sexes, and ages alike; people in good hygienic condition suffering more than others in less favorable circumstances, but less exposed to the infection.

A FEW OF THE SYMPTOMS.

Dengue is a disease of a variety of types. The study of the malady through several months has impressed me that it is peculiar in this regard. The common belief is, that it is a trifling complaint, attended with a good deal of pain and temporary suffering, but never fatal; and hence it has been lightly spoken of. Our text-books teach us that it is a mono-paroxysmal fever, of short duration, accompanied with aching and pain in the muscles of the limbs, back, etc., and constantly followed by an eruption, and there is the end of it.

In the greater number of cases all this is true, but the whole story is not told. It is a fact that it is rarely attended with fatal results; but my observation is, that there are few disorders which express themselves in so many ways, or that are subject to such serious complications, and that have such distressing sequelæ following in its wake.

A case of simple dengue has usually but little prodromata: and, where there are, they consist in general *malaise*, chilliness, headache, and loss of appetite for a day or two before the attack is developed; but generally there is little warning of its approach. A person rises in the morning feeling perfectly well, and is suddenly seized, whilst engaged in his daily occupation, with sensations of cold running along the spinal column, pains in the limbs and joints, perhaps only one joint of a finger or toe.

I have seen it, in several instances, begin with children by a convulsion; a child being waked up at night by a spasm, who, perhaps, had not shown previously the least evidence of ailing. The temperature begins to rise at once, and attains its maximum usually in twelve or twenty-four hours. The fastigium is generally very short; and the defervescence is rapid, and characterized by a succession of remissions and exacerbations, the temperature of each remission reaching lower than, and that of each exacerbation not so high as, that of the preceding, until it has fallen one to one and a half degrees lower than the natural heat of the body. During the next few days, if the case is closely watched with the thermometer, it will be found that the temperature fluctuates from a degree below to one or two degrees above the normal heat. By the end of the sixth or seventh day there is a very slight rise again, being a secondary fever; but, as a rule, this heat soon subsides, and temperature remains normal, unless there is a relapse, which is not uncommon, even in the mildest forms of the disease. After complete defervescence the pulse often becomes slower than natural, and occasionally runs down to sixty or sixty-five per minute. During the pyrexia the pulse is moderately quick and generally soft, skin usually hot and dry (occasionally moist), loss of appetite with nausea, and a very peculiar, bitter taste in the mouth. The bowels are variable, oftentimes inclined to constipation, with borborygm and painful flatulence.

I have seen a few cases begin by attacking the mucous membrane of the alimentary canal in the form of a very painful diarrhœa or dysentery.

Dengue is an eruptive fever, and characterized in a certain percentage of cases by successive crops of different forms of eruption. In some cases there is an initial rash, resembling mild scarlatina; but this is very evanescent, and occurs at the very beginning of the attack, and disappears the first day, and hence is very easily overlooked. I have seen it begin as red patches on the face or forehead, and coalesce, giving a uniform redness, which might be mistaken for mere flush. This is occasionally over the whole surface of the body; and then it becomes a homogeneous dull redness, more dingy than the bright scarlet of scarlatina.

The secondary or terminal rash occurs after the defervescence of the fever, oftentimes from the fifth to the eighth day; but I have seen it on the fifteenth day. The terminal rash is far more frequent in dengue than the initial; but, as has been remarked, I have seen it appear in successive crops. In the majority of instances the terminal rash is miliary in form; but I have seen it resembling measles, urticaria, herpes, etc. This brief description will in part represent a mild case of simple dengue running its usual course. But there are cases which are even milder, and also cases far more severe and much more protracted. In the midst of an epidemic, there are a very large percentage which have some of the symptoms, such as white tongue, bitter taste in the mouth, headache, prickly sensations in the eyes, very slight pains in the limbs, but, as far as we know, have no fever, and yet in a few days they will show the characteristic eruption well marked. These cases have been termed *dengue sine febre*. This type is perhaps more common among children, and the first intimation oftentimes that the child had had the disease is the appearance of the terminal eruption. A severe attack of dengue is ushered in, much like the milder form, suddenly, with chilliness along the spine, pains in the limbs, back, head, etc., and with every symptom intensified. As the fever rises, there are intense throbbing of the temples and forehead, great intolerance of light, dilated pupils, eyes red and congested, fever from 104° to 106°, stiffness in the nape of the neck, rheumatic pains in every part of the body, a feeling as though the bones were being pulled apart, occasionally swelling of the joints and articulations, white furred tongue (I have see it clean), loss of appetite, with loathing at the sight of food, and a peculiar, bitter taste in the mouth. The initial rash is often limited to erythematous patches on the face and neck, chest and arms, sometimes appearing like angry blotches of prickly heat. The forehead becomes swollen and puffy, the eyelid edematous, and the lips thickened and prominent, all betokening serious determination towards the head. Urticaria is more often the initial eruption in the severe cases; and, when they begin to improve, there is decided desquamation; and in a few the skin of the soles of the feet peels off not unlike scarlatina, and the tenderness, with some slight desquamation and peeling, has been known to continue for several weeks.[1]

[1] There are cases where the eruption comes out in successive crops every week or ten

The severe pain in the head is very distressing; and, from the results that now and then follow, must be due to slight congestion of the brain or its meninges. The heavy aching and throbbing of the temples, and balls of the eyes, with dilated pupils, are marked and significant symptoms. I have seen a few cases where I dreaded coma, and where there was indisputable evidence of the brain-coverings being involved. I saw a most interesting case of this kind, where the pupils of the eyes became permanently dilated, with almost complete loss of sight, for perhaps a lifetime. This person was attacked in the early part of September with all the characteristic symptoms of dengue, the fever on the second and third days rising as high as 105°. After a few days the heat moderated, but still there were irregular exacerbations of fever for three months. At the end of the second month she was taken out of bed, and placed in a reclining easy-chair every day, and began to gain a little strength; but, throughout a long convalescence, there were constant recurring attacks of intense throbbings in the eyes and temples, and at such times the temporal artery would stand prominently out like a threatened apoplexy. This case has resulted in glaucoma, and has been operated upon by Dr. C. R. Agnew of New York, with a faint hope of saving her from total blindness. He has kindly furnished me with the following note of the condition of her eyes six months and a half after her first seizure of dengue: —

"Mrs. T.'s present state is as follows: Glaucoma simplex in both eyes. Vision gone in right eye. Vision reduced in the left eye to uncertain counting of fingers at six inches. Both pupils dilated and insensible to light, and the anterior chambers shallow, the lenses being somewhat pressed forward. Ciliary vessels moderately turgid. Tension of the eyeballs increased (T X2). Ophthalmoscopic appearances. Broad, very deep excavation of both disks; details of fundus indistinct on account of haziness of media. March 15, 1881. — Double iridectomy upwards; under ether."

Thus it is that we have in the severe forms of dengue the nervous centres suffering very much: but it is not confined alone to this type; for there is evidence within the reach of the thoughtful and vigilant physician, that, in a few of the milder forms of the disease, there are cerebral lesions and neurotic complications.

days for several months after recovery. Whether it is due to the poison of the disease, or to the condition of the stomach, is not always easily decided. There have been those who have considered the symptoms as altogether symptomatic of the gastric disturbance, and that the intensity of the eruption and extent were proportional to that disturbance; that those who were known to be dyspeptics had the eruption more extensively than others; that literary and sedentary characters, and those whose occupations were such as were likely to derange the chylopoetic organs, suffered most from nausea and vomitings and other symptoms of gastric disorder; and in such cases the eruption was always most extensive and marked, upon the principle, which is well known, that there are certain vegetable and animal diets which will occasionally produce an effervescence on the skin, and sometimes nettle-rash. An enthusiastic follower of Brussais would see in this the "veritable gastro-enterite."

DURATION.

Dengue is doubtless a self-limited disease. In the vast majority of cases it runs its course in from three to eight days; but I have seen it last longer: in fact, after it has run over a certain period, it has no limit that I am aware of. The heat will rise and fall most irregularly, and at times give hopes that the fever is at an end, and then treacherously return again, and in this way keep up for weeks and even months. It has become a habit with the profession to call every fever typhoid which does not terminate in a few days.

By way of keeping up the popular custom and appeasing the minds of anxious friends who do not understand the laws of diseases, and who do know that typhoid is a long fever, some may call the protracted cases of dengue typhoid; but I have been unable to see any thing like typhoid in them, save that they have fever, and that it is prolonged into weeks. Such cases need not embarrass our diagnosis, although they are liable to do so, for throughout their course the semeiology of dengue will always be present. The swollen and heavy-looking face, like the face of a person who had been sitting over a hot fire; the congested and maturating eyes, with open pupils; the habitude of mind; the recurring soreness in the muscles and joints, with hyperesthesia of the surface; the tough, viscid, ropy mucus in the mouth and throat; the feeling now and then of faintness in the horizontal position; the enlarged papillæ of the edges and tip of the tongue; the regular, perhaps inclined to be constipated, bowels; the great irregularity in the exacerbations and remissions, and the constant inclination of the heat to fall below normal, without any material abatement of the serious symptoms; the intense and peculiar bitterness of taste in the mouth, together with the conspicuous absence of the leading symptoms of typhoid, — should enable any ordinary diagnostician to make the distinction.

COMPLICATIONS AND SEQUELÆ.

Aside from the nervous complications attending and following dengue, there are no sequelæ so common as those which appertain to the heart. I am unable to say in what percentage of cases the heart is affected; but they are doubtless quite frequent, and, besides being very distressing, they prolong the convalescence into weeks and sometimes months. I presume that, in all epidemics of dengue, there are a certain number of cases which have a most prominent rheumatic feature in them. I am led to infer that they differ very much in this regard, as well as in other respects. It is certain that an epidemic will change from week to week, or from month to month. In other words, during one month we may see one type prevailing mostly, and later on another type will be commonly met with. In the hot months of August, September, and October, I very rarely saw cases with decided rheumatic symptoms; whereas later in the season, and after the cold weather began, this type became more common. Whether the cold had any influence in producing this change, I was unable to decide. I imagine, that in some epidemics

rheumatism must have been one of the most prominent features in a majority of the cases, from the fact that it has been called "scarlatina rheumatica," "eruptive rheumatica," etc. The question has often suggested itself to me as to whether dengue affects the heart in the same way that rheumatism is known to do. I am inclined to think that it does not. I do not think that the heart is as seriously affected or as permanently disabled by dengue as it often is by rheumatism; and am sure that in the majority of cases where heart troubles followed, there had been no special rheumatic symptoms primarily. This complication is not apt to occur in the early stages of the disease, but comes on either after the fever has subsided, or after the second or third week of its progress. It may occur in the mild as well as in the severer forms of the fever. My impression is, that it most generally attacks the muscular structure of the heart; but I have seen pericarditis and endocarditis as the result. Where the muscle of the heart alone is involved, we are apt to have extremely tedious convalescence. Such patients do not suffer a great deal of pain, but complain of a distressing feeling of debility and lassitude, together with mental sluggishness, depression of spirits, dulness, and *ennui*, making the least exertion an infliction. I have stated that a disposition to faint is a peculiar and very characteristic symptom of dengue. This feeling often comes over patients as they lie in bed, and sometimes is a very distressing one to them. In such cases the heart should be examined very constantly; for my impression is, that it is in these we most frequently have the muscular structure of this organ involved. They have a very rapid and weak pulse, oftentimes without any fever, and, if so, very little. In pericarditis we sometimes have very little or no pain at its inception; and then it may come on suddenly in the region of the heart, extending up to the left shoulder and clavicle. Occasionally we have sudden prostration, which becomes quite alarming; the heart beats tumultuously; the respiration is short and quick, with pain at the end of every expiration. A close auscultatory examination of such a case will find the pericardium involved. Partial paralysis is also one of the occasional complications. I saw one case where facial paralysis came on at the end of the second day of the fever. There was complete loss of motion in the muscles of the right side of the face and lips, with inability to close the right eye. The mouth was drawn to the left side, and there was anesthesia of the conjunctiva with congestion of the left eye. Several weeks elapsed before recovery. Peripheral paralysis, or paresis of the fore-arm and brachial muscles, now and then occurs. I have seen cases where the patient could raise the arm above the head; but it would fall immediately to his side again, he manifestly not having the power to hold it there. I have been at a loss to decide, in a few cases, where there had been frequent vagrant pains, whether they were due to neuralgia, or to that species of pain which occurs in posterior spinal sclerosis or progressive locomotor ataxia; but, upon closer examination, was satisfied the suffering was over the territory of recognized nerve-trunks and their branches. There are pulmonary complications which, upon close study, can be traced to dengue. In the early stages we have very con-

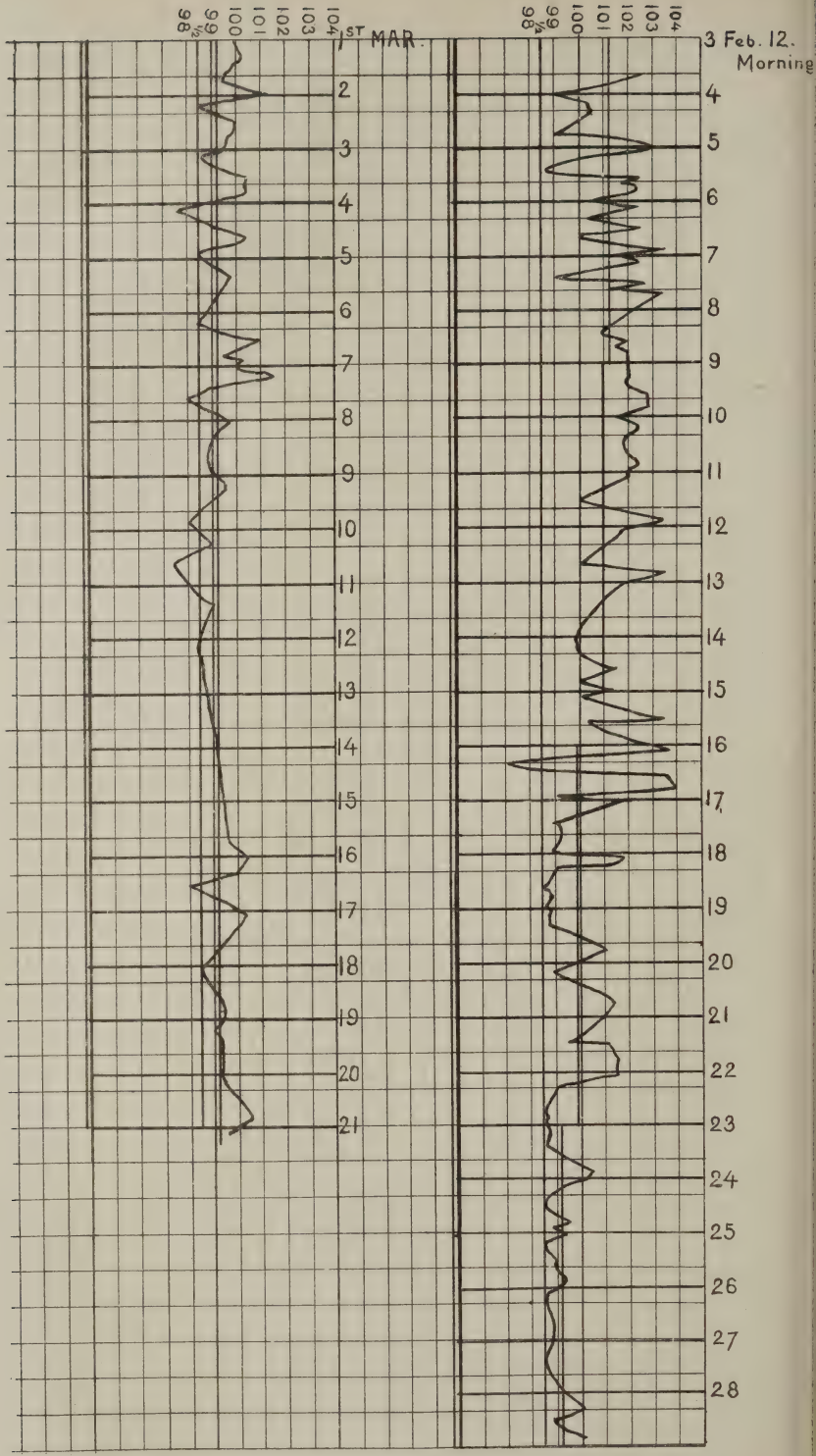
stantly a troublesome cough, which may remain and annoy long after the fever has subsided. It most generally assumes the form of catarrh of the fauces and upper parts of the breathing apparatus. This may extend down the larynx and trachea, or it may travel down the œsophagus. In the former, cough is the most conspicuous symptom; in the latter, a constant rising of phlegm in the mouth: but I have seen the saliva flow so freely as to give the idea to those around of ptyalism. In the vast majority of instances, by care and proper treatment, the cough soon subsides; but occasionally it does not, and, in rare cases, serious pulmonary trouble has resulted from it. In Bengal, dengue was supposed to very frequently develop into a form of phthisis. I saw two very rapid cases of phthisis, which had some peculiarities about them which I was disposed to think were due to dengue. I also treated a most singularly obstinate and malignant ulceration of the throat, where the tonsils and a portion of the palatine arches sloughed off, which I never would have thought of attributing to the influence of the poison of dengue, had it not been that this very unusual sequelæ had been noticed in more than one instance by some of the profession in India.

Glandular swellings, which have been always noticed as a complication in dengue, were not at all common in the first months of the epidemic; but, during the past winter, and especially since January, 1881, there have been many cases of this type, the swelling being principally around the neck and throat, parotid glands sometimes involved. Mumps, prevailing at the same time, made it often difficult to distinguish between them.

Dr. Dumaressy wrote an account for "The Boston Medical and Surgical Journal" (No. 32, September, 1828) of the epidemic of dengue then prevailing in New Orleans. He says, that, in many, there was inflammation of the urethra, which resembled so nearly "blennorrhœa luodes," that it was pronounced to be that; and, but for the violent asseverations of the patients of their innocence, this feature of dengue would never have been discovered. I have observed a few cases where there was irritation and discharge from the urethra and neck of the bladder, which seemed to be due to the same cause.

DOES IT REPEAT ITSELF?

I do not think that one attack of dengue furnishes any immunity whatsoever to a future one. On the contrary, whilst the epidemic is in progress, once having had the disease makes a person more liable to it than before: in other words, relapses are extremely common. Dr. Charles of Calcutta thought, that, whilst one attack did not confer absolute protection from its recurrence, yet it did to a certain extent. He had excellent opportunities of forming an opinion upon this point, as it prevailed more than one season in succession in Calcutta. Whether, therefore, those who have had the disease one year are liable to it the next, I cannot say; but I am sure that I have seen it repeat itself five or six times in the same individual during the past season: and wherever a person, having had the disease, afterwards took cold or any other slight ailment, it constantly assumed the livery of dengue. I may say, also,



EXPLANATION. — This heat chart represents a case of Dengue of two months duration. Record begins on the 3d of February, ten days after seizure. The temperature was taken and noted every two hours, and from this record this chart has been made. The first ten days — not represented — the fever probably averaged higher than at any other period. The heat line illustrates most clearly the irregular exacerbations and remissions in Dengue. Beginning with the fourth week, for ten days the patient was entirely unconscious; for more than a month showed great habitude of mind. Pupils much dilated, with intolerance of light. Patient now slowly convalescing — March 25th, 1881. (Faces p. 147.)

that I attended two persons with it, who informed me that they had it in 1828, and several who had the most lively recollections of its pangs in 1850.

DOES COLD ARREST IT?

To this question I must reply most emphatically in the negative. The disease made its appearance in Savannah in the early part of August, 1880; and in September, October, and November it prevailed as an epidemic. Few people escaped it in some form who were here during those months; for, if there ever was a disease which requires tribute from every one who comes within its influence, it is dengue.

The winter of 1880–81 has been unprecedentedly cold. The weather records, I make no doubt, will show the lowest continued temperature for several decades; and yet I have seen the malady in every month during the winter. A large number of the citizens who were away for the summer did not return until late in November, or the first of December, when the epidemic had spent most of its force; but many had it nevertheless. The cases during the winter have been vastly less in number, but, if any thing, severer in type; at any rate, more protracted.

IS IT A FEVER OF ONE PAROXYSM?

There are a large number of cases which run a mild and simple course, having but one paroxysm, with, perhaps, a slight secondary fever. But, in many cases where the thermometrical record was kept regularly, the fever was found to both intermit and remit, oftentimes without any regard to the hour of the day. In this feature, dengue presents at times a strong contrast to our winter malarial fevers, as well as typhoid, both of which nearly always decline in the early morning, and exhibit an exacerbation in the evening.

The idea of dengue being always a mono-paroxysmal fever arose prior to the constant use of the thermometer in practice, and that this error should have been kept up so long is easily comprehended: for in a long case, after a few days, the skin feels to the touch very cool and natural; but accurate observation will show that there is still abnormal heat in the blood.

WHAT IS ITS PATHOLOGY?

Of its pathology there is little known, except by inference. Being proverbially a non-fatal malady, there have been but few opportunities for studying it in a pathological sense. There is absolutely nothing known of its morbid anatomy. I believe, that, when dengue has been studied more thoroughly, it will be ascertained to be, at any rate, the remote cause of death more frequently than we have heretofore been led to suppose; and yet I am compelled to say, that usually, in its worst form, with symptoms which in any other disease would probably prove fatal, we may expect ultimate restoration. It seems to be the law of dengue that recovery ensues, just as it appears to be the law of some other epidemic diseases that death must follow. But, as I have seen two of the most important vital organs involved in its complications

with very grave symptoms, I must believe that it is more often fatal than it has the credit of being.

DOES IT EVER DEVELOP INTO YELLOW FEVER?

From its earliest history in the West Indies and America, dengue has, by a certain number of very reputable observers, been associated with yellow fever. Prevailing, as it does, mostly in the same latitude, it has by coincidence been a forerunner, and it has followed epidemics, of yellow fever; and in consequence of these facts, associated with several symptoms, which have some resemblance in a few cases now and then to be seen, it has been stoutly maintained that the two diseases were due to the same cause.

Dr. Osgood was perhaps the earliest to hold this belief, and advocate this theory. He, as has been said, wrote an account of the first epidemic of dengue which, as far as we know, ever occurred in Havana. His article appeared in the October number of "The Boston Medical and Surgical Journal," 1828. He says that the yellow fever had been prevailing in Havana for some months previously, but had almost entirely subsided, when a "new disease" sprang up, which the Spaniards called "el dengue." He tells us that the new disorder spared none, that it "attacked the natives as well as the transients;" and he makes the important observation that those who had had the yellow fever but very recently were not exempted by the new intruder. We must suppose that dengue was "new" at that time to the Havanians; but certainly yellow fever was no novelty to them. Dengue had prevailed on some of the sister islands the year before, notably the island of St. Thomas, where, as aforesaid, it had received the name of "dandy fever;" and, when it broke out in Havana, the inhabitants giving it a name in their language which signifies almost the same as the term which the English-speaking negroes bestowed upon it, appears as if they had recognized the appropriateness of the name, and that it was literally a stranger to them. We can perhaps excuse Dr. Osgood for not discriminating between the two fevers a half-century ago; but with all that has been acquired since, and with all the appliances that obtain at the present, it is unaccountable that any one should still confound them. We may allow that Dr. Osgood was fully up with the medical knowledge of his day; but there was no real expert knowledge of the two diseases in existence at that time. It requires experts to discriminate between diseases, as it does in the botanist to distinguish one plant from another. We may have two diseases resembling each other very much, as we may have two plants or trees looking alike, and yet entirely different to the eye of the expert. Dengue and yellow fever must both be classed as fevers: they have been considered as fevers of one paroxysm; and their duration in many cases being approximately the same, and there being a slight resemblance, in a few cases of dengue, to the metaptosis which is so marked in yellow fever, some physicians have concluded, from this feature, that they were due to the same cause. There are a few cases of dengue, when the fever begins to decline, which appear to change their type, and the pulse diminishes in frequency, and suggests the idea of yellow

fever; but there is a strong contrast in the two diseases, even whilst this metaptosis is taking place. In yellow fever, whilst there is a falling of the pulse, there is a rising of the temperature; and in dengue there is no such divergence, but we have the heat descending with the pulse. This feature of apparent resemblance has been more dwelt upon by those who advocate their identity than any other symptom; and thus it will be seen, that by careful observation this argument falls to the ground. This feature is far less common in dengue than it is in yellow fever. It is highly probable that in many instances the causes of these diseases have prevailed at the same time; and, where such was the case, they may have partaken of each other's character. There are those in the profession who advocate the theory that they may be hybridous. This was said to be the case in the island of Bermuda in 1837. It appears to be a settled fact that one attack of yellow fever furnishes a certain amount of immunity from another. No one claims that the exemption is perfect, and yet all experience teaches that it has its effect. If this be so, and dengue and yellow fever are identical, then an attack of the one or the other ought in a manner to exempt from a future recurrence of either of them. This would appear to be logical reasoning. But is this a fact? Most decidedly not. Dr. Osgood states, that, in the first outbreak of dengue in Havana, persons contracted it who had but very recently recovered from yellow fever. Yellow fever prevailed in Savannah in severe epidemic form in 1876, and but few persons who remained in the town escaped its influence. When dengue made its appearance in 1880, I think the medical profession were quite interested to observe whether a previous attack of yellow fever would give an exemption from dengue. As far as I know, there is but one opinion; and that is, that it does not.

It is a well-recognized fact that yellow fever, even in its mildest form, has a decided hemorrhagic tendency. The poison appears to act upon the blood, and produce a dyscrasia; so that, wherever there occurs an abrasion or blister, it is liable to bleed severely. This dyscrasia of the blood is oftentimes so great that the vessels cannot hold it well, there being a constant tendency to sipe through the walls. It is in this way that we have black vomit. It has been contended that dengue has the same tendency. If so, I have failed to see the faintest appearance of it in a single instance. I have seen a few cases with slight epistaxis, but much less of this than is seen in typhoid fever. In dengue the mucous membrane of the mouth and throat is constantly much involved; and we have sometimes a damask redness of the gums, cheeks, fauces, and posterior third of the palate. In such cases the follicles of the mouth, etc., are much enlarged and prominent; and we have a great deal of tough, ropy mucus, which is dreadfully annoying, causing the patient to vomit and retch in the effort to raise it. If the straining has been very violent, we may have streaks of blood upon the phlegm, and very rarely a little bright red blood is brought up, which is evidently from an abrasion in the œsophagus. I have seen the œsophagus very much involved with a feeling of obstruction in deglutition. One case came under my observation

where an abscess formed low down in this tube, broke, and discharged a quantity of pus.

Albumen in the urine has become one of the diagnostic symptoms which is very much relied upon in doubtful cases of yellow fever. It is as near pathognomonic as any other. I examined a large number of the severest cases of dengue, and did not find a trace of it in a single instance. The urine is generally abundant, acid in re-action, and free from sediment. I saw a few cases of retention, but never one of suppression. I found the records of only two deaths of dengue in India, among the English troops, where there were *post-mortem* examinations made. Both of them are said to have had heart-disease, and no other light is shed upon the dark subject by these lone autopsies. Whether they were examined with the view of settling the vexed question under consideration, we are not informed; but I suspect not, for the reason that the belief in the identity of the two diseases does not prevail amongst the English profession in India. On the contrary, Mr. Sherriff and others thought that dengue presented symptoms which apparently made it a compound of two diseases, — that it was caused by a mixture of two kinds of *materies morbi*, one of which is like that of an eruptive fever, and the other the same as rheumatism or gout. Hence, when we think of the several maladies with which it has been confounded, we might with equal propriety say that it is a compound disorder of rheumatism, scarlatina, cerebro-spinal meningitis, and yellow fever; for it has been mistaken for each of them. But I consider dengue as *sui generis;* presenting at times some slight resemblance to several diseases, but having its own distinctive features, with abundance of evidence for recognizing it as a substantive. There is one remarkable peculiarity of dengue which, in itself, ought to settle the question of its not being the same disease as yellow fever. I refer to its benign nature as far as the destruction of life is concerned. While I do not regard it as the light and trifling complaint it has often been supposed to be, — on the contrary, fully realizing that it is subject to very serious complications, — yet, withal, when we compare it to the perniciousness of yellow fever, its benignity is one of its strongest characteristics. Take it in its severest type, with a temperature of 106°, and every symptom not only distressing, but ominous, and it will always give us immeasurably more of hope, when we recognize it, than yellow fever. Take it when it assumes a slow, continued form, running on for weeks, and even months, in spite of our best endeavors to check it, and we can make a more favorable prognosis than we can in typhoid fever. Take it when we have cerebral or meningeal complications, with the mind of our patient wandering, and filled with hallucinations and illusions, and yet we can cheer and comfort the anxious friends and attendants with the surety that all will be well in the end. Take it in its tedious and weary convalescence, when despair is written on every lineament of the patient's countenance, and we can instil hope into his mind that he will ultimately regain his strength and buoyancy. Take it when the patient is up one day and down the next, or when, from palpitation of the heart, the most dreadful forebodings are perpetually haunting him, and yet we can give

him assurance that he will be better. That it does destroy life in rare instances, I fully believe; but this is not the rule. I think that I have seen instances where it snapped the cords of life when the heart was previously weak and diseased; but it was then intercurrent in its effects, and hence must require further and more thorough study before we can assign with exactness its influence in producing death.

I have said that the cause of dengue is not destroyed by cold. In this regard, I think it differs from yellow fever. I do not think there can be a shadow of doubt that cold will arrest, to all intents and purposes, an epidemic of the latter; but I do not think the same can be said of the former.

TREATMENT.

Dengue being a self-limited disease in the vast majority of cases, the physician finds it his simple duty to make the patient as comfortable as possible, and allow the disease to run its course, being always vigilant as to the complications which may arise. To ease pain in the limbs, back, etc., morphia is his sheet-anchor. I have found a mixture of morphia, tincture of gelseminum, and tincture of aconite, a happy combination to meet many of the indications. The morphine subdues pain, the tincture of gelseminum appears to relieve the tendency to congestion of the brain, and the aconite lowers the fever. In the rheumatic type, and especially where the temperature runs high, I have found the salicylate of soda of decided benefit. It removes the aching of the limbs and the swellings about the joints; and, if pushed to its full extent (say five to twelve grains every two hours), it soon reduces the temperature. The bowels, which are often inclined to be constipated, should be opened in the early stage; and, after that, a daily evacuation should be secured. The use of digitalis, when the heart becomes affected, gives the very best results in strengthening this organ. In a long, tedious case, the proper nourishing of the patient becomes of the utmost importance. To take care of the digestion and conserve the strength of the patient, and combat symptoms as they arise, will tax all the energies that the medical attendant can bring to bear upon his case. To do this, he must always be on guard, and follow the expectant method; for there are certainly no known remedies which, with absolute certainty, can be calculated upon to jugulate a continued case of dengue.

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IX.

THE RELATIONS OF CERTAIN FILTH DISEASES TO COLD WEATHER: PNEUMONIA, DIPHTHERIA, CROUP, AND MEASLES.

By A. N. BELL, A.M., M.D.

Filth diseases are those which are now everywhere regarded, at the outset at least, as the result of removable causes, and, therefore, include all such diseases as are caused by emanations from a foul soil, from swampy and water-logged land, soakage from surface filth and sewage, or the effluvia caused by overcrowding and deficient ventilation in tenement-houses, schoolhouses, churches, and other crowded places, promotive of malaria in its most comprehensive sense. It is in this connection that pneumonia has attracted the attention of the writer as a filth disease for many years.

Thirty-eight years ago he found himself in a conflict with many cases of pneumonia, at about this time of the year, on the heels of an unusually severe epidemic of malarial fever in Northampton County, Virginia, — a region at that time notorious for the prevalence of autumnal remittent and intermittent fevers. In that, his first encounter with pneumonia, he learned to look upon it more in the light of some of the oldest authorities than his then recent instruction. In short, from that time continuously he has regarded pneumonia more as a systemic than as a local disease; inflammation of the lungs bearing the same relation to it as inflammation of the throat to diphtheria and croup, or bronchitis to measles.

But it is less the purpose of this note to discuss the lesions, than the causes and conditions of pneumonia to other diseases of acknowledged filth origin. Evidence that persons living over damp, cold, swampy regions, or over soil fouled by domestic filth, are peculiarly liable to pneumonia, is as old as Hippocrates; and, all the way down to the present in medical literature, no age or country is lacking in evidence of liability to pneumonia under the conditions first taught by the father of medicine.

But in the early history of this disease by American writers on the subject, where recognized under the conditions referred to, it is commonly treated of under different qualifying names, such as "typhoid" or "typhus" pneumonia, "bilious" pneumonia, "cold plague," "congestion of the lungs," etc.; all meaning the same disease, but all agreeing in the fact that it has frequently prevailed in the cold, swampy regions of South Carolina, and more northerly regions of similar character in this country, epidemically.[1]

[1] Dickson, John Bard, Gibbes, and others, quoted in Watson's Practice of Physic. Condie, 1845, pp. 611-617.

On the other hand, some of our most recent and best living observers of vital statistics (for example, Drs. J. J. Quinn and H. B. Baker), from a brief period of observation, — having found "that, in months when more than the average number of deaths from pneumonia occurred, the air was colder and drier than the average, and that, in months when less than the average number of deaths from pneumonia occurred, the air was warmer and more moist than the average,"[1] — conclude that a cold, dry atmosphere is the especial cause of the disease, and that exposure to it is the chief thing to be guarded against for its prevention. Notwithstanding, these observations of Drs. Quinn and Baker are by no means irreconcilable with the correlation of pneumonia and the zymotic diseases, which it is the purpose of this note to show: on the contrary, taken in connection with other carefully collated facts in Dr. Baker's statistics, they strengthen our conclusions. These observers fall short only by concluding their inquiry, after having satisfied themselves of a common secondary cause of the disease, without further pursuit.

It is particularly noteworthy, in one of Dr. Baker's tabulated statements of deaths from all causes throughout the State of Michigan, that pneumonia and typhoid fever are coincidently prevalent, being respectively the most prevalent in the same counties, although at different seasons; the respective numbers of deaths from these two diseases, for the year 1874, being, from pneumonia, eight hundred; typhoid fever, six hundred and ten.[2]

Another important illustration of the correlation of pneumonia with zymotic diseases is shown by the same statistician in regard to infant mortality, — the very class, of all others, certainly, which is most exposed to the dangers of *in-door* emanations, rather than to the cold, dry atmosphere by which in-door emanations are promoted.

Dr. Baker remarks, "The subject of infant mortality is important for many reasons; one being that it is believed to furnish a guide to a knowledge of healthfulness of localities, and at different times, because unhealthful conditions more quickly prove fatal to children than to adults. Excessive mortality of children, therefore, is an indication of sanitary work, not only for the prevention of infant mortality, but of the evil effects of unsanitary conditions on the infants and adults who survive, but are so injured as to lead imperfect lives thereafter."[3] The full significance of these remarks may be best appreciated when taken in conjunction with the important showing, that one of the most prolific causes of infant mortality in Michigan is pneumonia, and that "more than one-third of all the decedents from this disease in 1874 were under five years of age, the per cent being 34.50." But, of that particular year, Dr. Baker further remarks, that the temperature was very low in April, and there was a corresponding increase of mortality from this disease. But the deaths from it were also unusually numerous in March, when the temperature was even a little higher than usual. The highest rate of mortality from pneumonia obtained by Dr. Baker, taking one year with another, was in

[1] Seventh Registration Report of Michigan: Vital Statistics, 1873, p. 278.

[2] Registration Report, 1874, pp. 308-9. [3] Vital Statistics, 1873, p. 137.

February, March, and April. Making the comparisons of deaths and conditions of 1874 with those of preceding years, it would seem, however, that the evidence of causation of deaths by pneumonia is stronger in relation to humidity than to temperature, and rather stronger relative to ozone than to humidity; but it would appear that the unusually high pressure of the atmosphere during the first part of the year 1874 may have had even a closer relation to the deaths from pneumonia than had any of the other meteorological conditions." [1]

The highest rate of mortality from pneumonia observed by Dr. Baker, one year with another, was found to occur during the months of February, March, and April.

The whole of Dr. Baker's reasoning on the cause of the disease, however, is based upon the assumption that it consists in exposure to a cold, dry atmosphere, with the presence of a more than average amount of ozone. This conclusion we believe to be fallacious, only in so far as these conditions of the atmosphere act indirectly by promoting exhalations from foul cellars, house-drains, and other domestic impurities.

Taking another careful collection of statistics, but of a dense population (Dr. Baker's being of the State of Michigan at large): in the report of the Board of Health of New York, 1874–5, there is a summary of pneumonia for four years (March 1, 1871, to March 1, 1875), during which period the number of deaths from pneumonia was seven thousand eight hundred and seventy-three; and in this population, as in that scattered over the State of Michigan, a very large proportion (three thousand six hundred and twenty-three, or nearly one-half the whole number) was of the class most exposed to in-door dangers, — children under five years of age. By this report it also appears that the greatest prevalence of the disease occurs in the spring and winter months, increasing usually from November to April.

Dr. Francis Delafield, who collated these statistics, remarks, in connection with them, that, "so far as these four years go, they seem to show, that, in persons over five years old, the combination of a low temperature with great daily range of temperature is accompanied with a large number of deaths from pneumonia.

"In children under five years old the curves of mortality do not seem to correspond very closely, either with the lowest temperature or the daily ranges of temperature. The mean height of the barometer for each month of the four years is given; but there seems to be no close relation between the height of the barometer and the mortality. The greatest mortalities seem to correspond to rather a low barometer. The mean humidity for each month of the four years is also given; and, in the spring and winter months, there is some correspondence between the degrees of humidity and the mortality: the greater the humidity, the greater the mortality. This is especially the case if a low temperature exists at the same time as a high degree of humidity."

From a summary for seven years (1870 to 1876 inclusive) in the Philadelphia "Board of Health Report," 1876, the infantile mortality from pneumonia

[1] Michigan Vital Statistics, 1874, p. 299.

to other diseases bears about the same relation as in the State of Michigan and the city of New York, — the number classed under the head of congestion and inflammation of the lungs being three thousand five hundred and fifty-six; croup and diphtheria, three thousand one hundred and fifty-six; and, correspondingly, most prevalent during the colder months of the year.

Finally, it must be borne in mind, that, in the classifications now considered in Michigan and New York, pneumonia only is considered, to the exclusion of a large number of other closely allied acute lung-diseases; and, in Philadelphia, congestion of the lungs only is added, but still also excluding the deaths from other acute lung-diseases due to the same cause. Taking the weekly statistics of the National Board of Health "Bulletin," for the twelve months ending with Sept. 4, 1880, with the view of showing, as far as practicable, any difference in results of cities situated different from one another in relation to climate, an analysis of the reports of nine cities reads as follows: —

ABSTRACT FROM NATIONAL BOARD OF HEALTH "BULLETIN" FROM OCT. 4, 1879, TO SEPT. 4, 1880.

Cities.	Diphtheria and Croup.		Measles.		Acute Lung-Diseases.	
	November to April.	May to October.	November to April.	May to October.	November to April.	May to October.
Boston	321	215	2	16	644	255
Brooklyn	569	382	97	54	995	541
New York	720	580	420	147	2,626	1,435
Philadelphia	336	250	88	15	1,339	1,177
Baltimore	245	178	2	13	283	113
Chicago	677	471	107	32	505	326
St. Louis	143	49	35	15	351	128
Charleston	22	14	..	..	93	33
New Orleans	50	43	21	47	220	91
Total	3,083	2,182	772	439	7,056	4,099

From the evidence here presented, in addition to a somewhat extended observation of pneumonia in its different relations under widely different circumstances, I draw the following conclusions: —

First, Pneunomia is a systemic disease, with a chief local manifestation in the lungs.

Second, Pneumonia and its congeners, acute lung-diseases, have filth for their chief factor and primary cause; and they should therefore be classed under the head of zymotic diseases.

Third, The influence of a cold, dry air, is secondary in promoting acute diseases of the lungs, of which pneumonia is the chief, in so far as these conditions of the atmosphere promote emanations by percolation into the warmer and more rarefied atmosphere of the domicile, and are mischievous in proportion to the extent of underlying and surrounding impurities, and the porosity of basement and cellar walls and floors.

The remedy is apparent.

X.

THE CONDITION OF THE MEXICAN POPULATION OF WESTERN TEXAS IN ITS RELATION TO PUBLIC HEALTH.

By J. H. POPE, M.D.,
Of Marshall, Texas.

[In order to allow the members of the Association an opportunity of attending the session of the Quarantine Convention, the paper was only read by title, and referred to the Publication Committee.]

If we should sail from the city of New Orleans, and land at Brazos de Santiago, Tex., nine miles this side of the mouth of the Rio Grande, we would feel very much as if we were on a foreign shore, in the midst of a foreign people. A large majority of those we met would be Mexicans, and we would hear little of any language among the laboring classes except the Spanish. The porters, the boatmen, the hackmen, the hotel-waiters, — nearly every one of them is Mexican. Most of them speak some English; but their every-day business language is Mexican, — a corrupt Spanish. This is true of all the Rio Grande border of Texas. If, now, we travel overland from this river eastward, we find this condition of things obtain to a gradually lessening degree, until we reach a nearly north-west and south-east line across the State, passing through San Antonio. Beyond this, the Spanish language is no longer of such importance, though it has by no means hushed. It is of this district of Texas, and of the lower class of Mexicans in it, that I write. The prevalence of their language is a good index of the proportion of Mexicans in the total population of that region. I had hoped to give the exact figures showing the relative numbers of Mexicans and all others; but the superintendent of the census at Washington has not yet classified the population by nativities. Neither have I been able to get answers from all the counties to inquiries on the subject. Taking, however, those I have to be a fair average, the Mexican population is sixty-six per cent of the total population of the district. In some of the cities and towns — as Brownsville, Laredo, and San Diego — ninety per cent of the inhabitants is Mexican. In San Antonio about twenty-five per cent is of this nativity. We thus see that a large majority of the people of that section is Mexican. Much the largest part of them belong to the lower class, or uneducated laborers. They have seemed to me to differ in some respects from other nativities of the lower class resident in Texas, and some of these differences have an important bearing on public health. It is the purpose of this paper to call attention to the more prominent of these peculiarities. Only brief space will be required to do so.

In the outset I desire to say that what I state is not entirely based on my own observations; but I am indebted to the following-named gentlemen for information (either by letter or in personal conversation) which has been of great value to me: Drs. Carothers, Coleman, Cupples, Graves, Herff, and Menger, of San Antonio; Drs. Küpfer and Wright of San Diego; Drs. Moeur and Boll of Castroville; Drs. Burke and Spohn of Corpus Christi; Dr. Gotliff of ——; Dr. Laton of Fort Concho; Dr. Watkins of Floresville; Drs. Combe and Melou, and Hon. Thomas Carson, of Brownsville; Drs. Arthur and Montgomery of Laredo; D. A. Seeley, Esq., of Carizzo; Judge Livingston of Starr County; Dr. Knoblauch of Ysleta; Dr. Eads of Marshall; Dr. Harrison of Fort Clark; Surgeons Waters and Heger; Assistant Surgeons Gorgas, Hooard, and Girard; and acting Assistant Surgeons Hanner and Buffington, U.S.A.

The first peculiarity we shall notice, as distinguishing the lower class of Mexicans, is the

HABITATIONS

in which they live. They are more overcrowded, I believe, than are the tenement-houses of New York, or the worst parts of Thames and Ann Streets, Baltimore, and, I had almost said, the Chinese quarter of San Francisco; but we would doubtless have to yield the palm to this place. The architecture of the dwellings is miserable. The Mexican's *jacál* (as he calls the hut in which he lives) is usually from eight to fifteen feet square, — rarely larger; is four to eight feet from ground to eaves, with no floors but the naked earth, a small opening for entrance and exit. If there be any window, it is generally not much larger than the trap-door to a fowl-house. The fireplace is built of mud or stone, many of the chimneys not reaching to the top of the roof. The materials of which they construct their *jacáles* are as various as one can well imagine. Some of the best huts are of stone; but only the most thrifty of the lower class live in these or the better form of *adobe* houses. The *jacál* of the poorest class is generally made by setting poles (generally *mesquite*), like posts, into the ground side by side, and chinking the cracks with mud, rags, straw, or any thing that will serve the purpose. Such is the wall. The roof is thatched. The material they prefer is a kind of palmetto that grows in some parts of that region. In lieu of this, however, they will use hay, old straw, cane, or the like. I have seen the walls of one of these *jacáles* a perfect quilt-work in the variety of the material used, — poles, short boards, mud, rags, pieces of tin cans, ale and beer bottles, and I know not what else, just so they enclose a place to live in.

All the family generally occupy the same room, and it seems to make but little difference how many individuals compose it. Often a family of "ten will occupy a hut not more than fifteen feet square." While making a house-to-house inspection of the Mexican portion of San Antonio, I counted twenty-five persons in one house, embracing members of three generations of the family. One of them informed us that they all lived "in the same house," which did not contain over four thousand cubic feet of space, or one hundred

and sixty cubic feet to the individual. And this in a house badly ventilated! Can we imagine much more unhealthy surroundings for human beings?

CLEANLINESS OF HOMES.

We would naturally expect such people to be careless about the cleanliness of their premises. As a rule, they are, according to my observations and the weight of my other information. They seldom sun or air their bedding. Dogs and other domestic animals are allowed free access to wherever they can enter. Usually there is no enclosure around the premises. Trash and many other kinds of filth are allowed to accumulate. They have no privies. They generally live in the suburban part of town or city; and, in place of privy-houses, some have a shallow pit a few feet from the door.

CLEANLINESS OF PERSON.

On this point authorities differ. My own observation (and I think I am sustained by a majority of those with whom I have communicated on the subject) has been, that, when Mexicans are near a water-course or other body of water, they bathe frequently during the warm season; but, when much trouble is necessary to obtain a bath, it is greatly neglected. Those who are hired as house-servants dress neatly. If there be no other incentive than their own pride or self-respect, the low class of Mexicans are very uncleanly in their dress.

CLOTHING.

In quantity and quality of clothing, about half of them are as well clad as other nationalities on the same plane; about half are worse clothed. Much warm clothing is not required by the climate of the larger part of that region; but there are portions of it where these people must suffer much from "northers," when the change is sudden to extreme cold.

FOOD.

In the selection and preparation of their food the Mexicans are more careful than any of the other "lower classes" I have ever had opportunity of observing. Their diet is not much varied; rather more, however, than negroes and whites in like station. They eat few fresh vegetables. They are universally fond of beans, and their *frijoles* would gratify the palate of the most fastidious epicure. Their bread is usually of Indian corn, ground by hand in a very primitive sort of machine (*metate*), and made into a kind of thin pancake, — *tortilla*. The favorite way of preparing their meat is probably the *chile con carne*, a coarse, hard hash, very highly seasoned with pepper and onions or garlic. The quantities of pepper and garlic these people consume is astonishing. Their meat diet is generally beef, goat, and sheep. They are fond of corn-meal dumpling stuffed with minced meat, and highly seasoned. It is generally put up in small packages by rolling in corn-shuck. These are their *tamales*. Mexicans drink a great deal of strong coffee.

DRINKING-WATER.

These people are very careless about their drinking-water. They have no wells if they can get along without them. They will haul in barrels from any neighboring water-course. If the water is very muddy, I am told, they use the bruised leaf of the cactus or a few pulverized almonds to "settle" it. They sometimes dig pits or small tanks on their premises in which to catch rain-water. I have seen these tanks, when dry, partially filled with many varieties of rubbish. I have passed them when clouds promised rain, and have seen the tenants making little trenches to guide the surface-water into them from the highways, littered with the filth of the cattle that travelled them, but never paying any attention to cleaning the reservoir. It is a sickening thought to decent people, that any animal should drink such water; but the lower class of Mexicans in portions of Western Texas do it.

OCCUPATION.

Constituting, as they do, the laboring class of that district, they are employed as herders, freighters, or teamsters in transportation-trains, farm-hands, etc. A few of them are mechanics. Their wages range from eight dollars to fifteen dollars per month for an adult male.

HABITS.

They are for the most part indolent and thriftless. Gambling is their national vice. They are intemperate in the use of intoxicating drinks, though one is surprised at seeing so few drunkards amongst a people so universally given to drink. Their favorite beverage is *mescale*, a preparation from the leaf of maguey, which seems to be the same thing as the American aloe (*agave Americana*). My own experience is, that such decided preference for this drink must be hereditary, or the result of prolonged education.

DISEASES.

All observers remark the prevalence of venereal diseases and small-pox among Mexicans. The first is largely due to their loose morals, which is much favored by their overcrowded habitations. Another factor which exercises a great influence on the propagation of all "spreading" diseases in their midst, is their proverbial indifference about exposing themselves to a disease, and neglect of treatment when they have contracted one.

It would be exceptional not to find at least a few cases of small-pox any time amongst the Mexican population of the towns along the Rio Grande border. They neglect vaccination, not because they oppose it, but rather on account of the trouble and slight expense attending the operation. The hygiene of their homes is exceedingly favorable to the spread of this disease. Another reason for the so constant existence of it is the fact that they regard all epidemics as specially sent by God, and only in his good time will they disappear; that it is useless to try to check them. They do not hesitate to

sleep with cases of small-pox. They do not limit their movements on account of it, but continue to mingle as freely as ever with other people. Neighbors and relatives visit and assist in nursing them, passing back and forth to their own homes. They oppose isolation in pest-houses, because they prefer to care for their own sick; and they do not think it has any influence in checking the spread of the disease.

Mexicans are fond of entertainments, shows, and all sorts of public gatherings. This is another means of spreading disease amongst them. It is the custom with them to expose the corpse in church before burial. San Antonio found it necessary to prevent this by ordinance.

I have never yet found a physician who has seen a case of diphtheria in a Mexican subject. This may be considered a little remarkable, when we remember the surroundings and habits of this people. Cholera spreads more rapidly among them than the whites.

Consumption is thought by most observers to be more fatal with Mexicans than other inhabitants of that climate.

Some physicians of long experience and practice among Mexicans in Western Texas, state that they are not so liable to malarial diseases — that is, intermittent, remittent, and typho-malarial fevers — as are whites and negroes in the same locality. Others say they notice no difference in favor or against them, while others still report the Mexicans much more liable to such diseases. We might naturally infer from their nativity that they would enjoy some immunity; but the result of my special investigations in some of the towns in the section I write of is, that the Mexicans furnish a larger proportion of malarial fevers than do whites or negroes. In August, 1879, there was scarcely a case of malarial fever amongst the whites in the city of Corpus Christi, while physicians reported not a few such cases amongst the Mexicans there. During the same season, in Brownsville, the information was, that the largest proportion of such diseases was in the Mexican settlements.

The rate of mortality among Mexican children under five years of age is very large. A prominent cause of death at such age is convulsions. *Tetanus neonatorum* is more prevalent among them than any class of people I ever saw or read of.

Some physicians along the Rio Grande have noticed for several years a number of cases of scurvy in the Mexican population.

CUI BONO?

Wnat good is to result from discussing the condition of these people before this convention? Certainly not the quick relief of these unfortunates? No; but the description I have given applies not to hundreds, but thousands, of human beings congregated in one corner of this Union. The sanitary condition of so many, however humble they may be, should, and I believe it does, interest this body, though it may not be able to afford any practical relief in the near future. The facts here detailed are further testimony that overcrowded habitations, want of education, and bad sanitation go hand in

hand with low morals, vice, and disease. Discussions here may in the end awake more active interest in reforms in that region. A pebble dropped here may by and by agitate the waters there. I should be glad to see reforms begin in some of those cities and towns, and of their own motion. I know of prominent and influential citizens there (physicians and others) who appreciate the need of reform. They would indeed be benefactors if they should influence a change.

WHAT REMEDIES?

The disease of most importance in connection with practicable remedial measures is small-pox. Vaccination first of all suggests itself as the surest and most direct remedy. If compulsory, so much the surer. But I do not believe compulsory vaccination absolutely necessary. If cities and counties would supply good virus and free vaccination to the indigent, an energetic city and county physician would leave very few unvaccinated in his territory. If compulsory vaccination were deemed best, no class of citizens would more freely submit to it than these Mexicans. The next remedy is a more radical one. The *jacál* should not be permitted as a habitation in the corporate limits of any city. They could be gradually abolished, — I believe without much hardship to proprietors or tenants. In three or five years there need not be one of them in such cities and towns as San Antonio, San Diego, Corpus Christi, and Brownsville. My information is, that these *jacáles* are not generally owned by the poor Mexicans who live in them, but by others, who could supplant them with healthier abodes, without making themselves paupers; but, however this may be, they should be abolished. They are a foul ulcer on the body corporate of those cities. The owners of them are accessories to the crime of menacing the lives of citizens by harboring serious contagious diseases contiguous to them.

This matter not only interests us as humanitarians, but there is a more selfish interest we have in it. That region, the most of which now seems so remote, will soon be at the very door of the commercial centres of the entire Union. Many lines of railway are vieing with each other as to which shall be the first to reach Mexico. Nearly every one of these projected lines passes through the section of which I write. It will then be of some moment, if not now, what spreading diseases exist among the inhabitants there. Self-interest will then prompt us to care whether or not small-pox is perennial there. It will not be a matter of indifference whether the habitations are filthy, non-ventilated *jacáles*, indefinitely harboring contagious diseases, their occupants, the chief laborers of that country, handling the thousands of bales of wool or other freights destined for our *metropoli*. The Mexican cannot then indulge his peculiar ideas of epidemics without involving some of the rest of us.

Railways will constitute a powerful agent in working reform in the proper direction. By these means cities will be brought into such relations with each other, that portable spreading diseases must be controlled. In the very midst of these people will be created a public opinion which will force the proper

municipal and other legislation to accomplish the desired end. But the history of such reforms is, that some bitter experiences are first suffered. This is not likely to be any exception.

I trust this Association will keep in view the particular evils of which I have attempted to treat, and upon all proper occasions lend its influence to the relief or cure of them. Whether by the course here indicated, or in another way, it matters not, so the result shall be the relief of some suffering, and the protection of the public health.

MARSHALL, TEXAS, November, 1880.

XI.

A BRIEF SYNOPSIS OF BREAK (BROKEN) BONE, OR DENGUE, FEVER, AS IT PREVAILED IN CHARLESTON, S.C., DURING THE SUMMER OF 1880.

By H. B. HORLBECK, M.D.,
Charleston, S.C.

This fever became epidemic about the first week in August, although some few cases were noted earlier, — June 11. There were a few cases just before cold weather in fall months of 1879. Mode of invasion was general, increasing *malaise*. Severe pain in head, lumbar region, and joints of the extremities. Some cases preceded by a chill before febrile action began. Pulse 110 to 120, — full and bounding. Temperature exalted. Highest noted, $105\frac{1}{4}°$; usually below about 103°. Diurnal change in temperature; 1° increase at night. Respiration quickened. Tongue flat, flabby, pale, creamy, fur darker in centre; tip red, indication of gastric irritation. Nausea constant and distressing. Vomiting in some cases, but usually the nausea alone present. Bowels constipated at first, with tendency to catarrh afterwards. Appetite none. No swelling of joints observed, yet intense pains. Cerebral disturbance, wild vagaries that would not be controlled by the patient, in some cases delirium. Eruption almost always present, exceptionally absent, varied in character. Erythematous, papular, and in convalescence pustular; profuse sweating constant. Hemorrhage from the nose frequent. Catamenial discharges usually prevented, although pregnancy did not aggravate the cases. Ecchymotic spots on the tongue and fauces; sloughed out and bled profusely in three or four cases observed. Urine did not contain albumen; great pain occasionally over bladder, increased by pressure. Relapse not general, and, where observed, from dietetic imprudence. No serious result, not a single death reported at the office of vital statistics, not contagious, not malarial. Treatment, quinine and mercurial purgatives; saline diaphoretics; cold used, ice sponging; hypodermic injection of morphine. Excessive prostration; slow convalescence, with neuralgic tendency for two or three weeks. Attacked both races. Number of cases estimated, fifteen thousand; population, fifty thousand.

H. B. Horlbeck, M.D., *City Registrar.*

XII.

"DENGUE, OR DANDY FEVER."

By Dr. D. C. HOLLIDAY
Of New Orleans.

The brief synopsis of the above disease, which I shall endeavor to give you in the following paper, is not drawn solely from my own observations, after having treated over two hundred cases of all ages and sexes during our recent epidemic; but in it I shall present a careful and correct tabulated result of the opinions of over sixty *confrères*, who had the kindness to candidly answer a series of interrogatories propounded in a circular which I addressed to the physicians of New Orleans, and to those also residing in all parts of the State where I knew the disease had prevailed.

As to the origin of the name and the general history of dengue, I will refer you to the very many able articles on this subject with which medical literature abounds.

Let us, then, come at once to the salient points presented by the recent epidemic, which was so sweeping in our city, and which extended over many of the contiguous parishes.

The opinion of the large majority is, that this fever was essentially *sui generis*, and not of malarial nature or origin.

Mode of invasion usually sudden; common type continued, with remissions consisting of a single paroxysm, lasting from two to four days, but sometimes prolonged to five or six; relapses not frequent.

In the recent epidemic, malarial complications often occurred after the disappearance of regular dengue, and only gave way to the free administration of quinine; whereas, in dengue proper, the large majority agree in stating that quinine was useless in their hands, either to relieve pain, decrease temperature, or shorten the paroxysm.

The attack was not generally ushered in by distinct chills or rigors of any marked severity, though patients, during the first twelve or eighteen hours, frequently complained of disagreeable sensations of creeping chilliness up and down the spine.

Many observers state, that, in children, the attack was usually more sudden than in adults, the latter often complaining for some days or hours of feelings of general *malaise*. The attacks usually began at night.

The almost universal belief is, that previous attacks of dengue or yellow fever gave no immunity during the recent epidemic. No age or sex was spared; though not a few believe children to have been more susceptible than adults, the colored race less frequently affected than the whites.

Might not these opinions, however, rather reflect the individual opportunities of the observer, than be really statistically correct?

The general benignity of the fever is established by the total absence of a single fatal case, as having been reported from by *uncomplicated* dengue.

The total loss of appetite and freedom from thirst is noted and commented on in all the reports sent in.

The majority of the observers prove the fact, that, from the beginning of the fever, there was a marked flushing of the face, which rendered the countenance at once striking and peculiar.

Although no *critical* days were established, the duration of fever was generally asserted to be from three to five days. The tongue was usually furred, deeply indented by teeth, soon becoming covered with a pasty, dirty-white coating; edges slightly, but not markedly, red; gastric irritability frequent; vomiting rare, though nausea often complained of. Several observers, however, insisted on the reverse.

Respiration was not particularly hurried, generally bearing the usual ratio to frequency of pulse and high temperature. Temperature was generally from 101.5° to 103°, in some cases rising to 105½°, and in one to 109½°, with a fatal result.

The quantity of urine was usually scanty and of high color, often normal: no cases of suppression mentioned.

The presence of albumen was detected and noted by several observers, though usually rare, and often a mere trace; but the majority of the physicians acknowledge not having examined the urine at all.

The characteristic pains of dengue (mentioned by all observers), complained of as occurring over the whole body and limbs, and of every degree of severity and kind, were constant, though aggravated by motion; headache especially severe and harassing, often lasting after disappearance of fever. In my experience, there was, in many cases, a severe præcordial distress, and uneasiness sufficient to produce perfect insomnia. The majority regard these pains as neuralgic, not rheumatismal; and, though resembling closely muscular rheumatism, they generally disappeared without producing effusions, or giving rise to any cardiac complications. In fact, no tendency to special or severe visceral lesions was mentioned by any one.

After the subsidence of the fever, prostration was often very great, chiefly occurring in children, accompanied by extreme restlessness, not infrequently by delirium and insomnia.

The eruption of dengue was very common, occurring in about forty per cent of the cases, showing no uniformity, often a simple efflorescence: in some cases resembling the miliary eruptions of scarlatina; in others, resembling measles, severe lichen, or partaking of the character of urticaria, of such severity, however, as to be followed in some cases by general desquamation. The itching proved as annoying as in ordinary severe urticaria.

The tendency to the occurrence of hemorrhages is reported upon as follows: Ten physicians report its occurrence in twenty-six per cent of their cases; seven, as frequent; twenty, as rare, but seen. Remainder failed to answer.

In my own experience, I saw two cases of undoubted black vomit occurring in two female children in the same family, of the respective ages of six and twelve years. Vomiting identical with black vomit of yellow fever. Both patients recovered. I saw the children, in consultation with Dr. Maringer of this city, who reports having treated both these children with yellow fever during the epidemic of 1878. Both these little patients recovered, though they were extremely ill, and prostration was very great.

I also met with four cases of severe epistaxis, and, in eight or ten females, a re-appearance of menstrual flow, though having occurred regularly and lasted the usual time, and having only ceased some eight to fifteen days before the attack of dengue.

To question twelve of interrogatories, In dengue occurring during pregnancy, was there any special tendency noted of its causing abortions? thirty answer no; five, yes; rest did not reply to question.

In my own experience, I saw no case where this tendency was observed.

Ætiology. — Many observers thought the hot, sultry weather, abundant rains, and general stagnation of air had a special effect in developing dengue as an epidemic. As to the question above, thirty replied in the affirmative; twenty, negative; one, questionable; and rest gave no answer.

Conclusions from answers received: —

1. Dengue is not malarial; monoxysmal type continued; remittent; duration from three to five days; not fatal.

2. Extremely sweeping; no age, sex, or color exempt; no respect for previous attacks of yellow fever or dengue.

3. The eruption or efflorescence occurring in forty per cent of the cases showing no uniformity in character or appearance.

4. Temperature often very high; suffering excessive; prostration often great.

5. Albumen reported in a sufficient number of cases to disprove the assertion that it is never found.

6. The tendency to hemorrhages positively proven; generally slight, sometimes serious, rarely or never fatal.

To question, Do you consider this disease contagious or infectious, or simply epidemic, as influenza? forty-five, simply epidemic, as influenza; four, as contagious and infectious; one, doubtful; one, questionable; rest gave no answer.

The majority of the replies observed no distinctive differences between this and former epidemics of dengue.

Treatment. — Almost universally expectant; some advised the early use of mercurial purgatives, followed by salines, diaphoretics, opiates, and hypnotics, to relieve pain and insomnia, etc.

To question twenty-four, Was the early and often even heroic exhibition of quinine in dengue followed by satisfactory results in your hands, whether in reducing temperature, relieving pain, or shortening duration of paroxysm? answer positively, no, forty; yes, ten; five, no answer; rest did not employ it.

I would here take occasion to remark upon the temperature-curves of dengue,

as given us by the late Dr. D'Aquin of our city, who asserted that there was a continuous and steady rise in temperature until the highest point was reached on the first, second, or third day of the attack; then a short stadium of a few hours; then a remission, soon to be followed by another fever, with rise in temperature, but never reaching point of first maximum temperature.

These views are *not* corroborated by the reports received by me, which establish a distinct *daily* remission, with a fall in thermometer of from 1° to 3°, with, of course, a corresponding rise.

A comparison between yellow fever and dengue might prove interesting: —

YELLOW FEVER.	DENGUE.
Single paroxysm.	Single paroxysm.
Temperature rising regularly.	Temperature remittent.
Pulse often becoming slower, while temperature rises.	Pulse rising with temperature.
Duration, seventy-two hours.	Duration, three to five days.
Tongue, white centre, red edges, pointed; conjunctivæ very much congested.	Tongue, broad, white, deeply indented by teeth, edges rarely very red.
Stomach irritable.	Nausea complained of.
Vomiting frequent.	Vomiting rare.
Violent pains back and head; great jactitation; hebetude great; eruption rare.	Pains occurring early; much *more* severe, and general early appearance of eruption.
Icterode hue appearing early; symptoms of nervous exhaustion evident and alarming.	Conjunctivæ rarely very red; præcordial tenderness on pressure rarely well marked; nervous exhaustion rarely alarming; jaundice never observed.
Secretions all suffering; urine scanty, often albuminous; suppression frequent.	Secretions natural; urine often normal, sometimes slight traces albumen.
Hemorrhages frequent and alarming, and black vomit an urgent symptom.	Hemorrhages slight, insignificant; black vomit rare.
Recovery exceptional.	Recovery the rule.

XIII.

THE PREVENTION OF CERTAIN CONTAGIOUS DISEASES BY LOCAL BOARDS OF HEALTH.

By JAMES CRANE, M.D.,
Commissioner of Health, Brooklyn, N.Y.

In our large cities a constant responsibility is imposed on our local health boards in respect of five of the diseases of the zymotic and typically preventable class; namely, small-pox, measles, scarlet fever, diphtheria, and whooping-cough. It is true they vary somewhat as to their prevalence and virulence from year to year and from season to season; but they are never far distant from any populous community, and they are a constant charge upon the vigilance and energy of the sanitary officials.[1] For the sake of convenience, therefore, they may be spoken of as the five "constant" contagious affections.

Small-pox, for example, may be absent during an interval of two or more years (with the exception of cases that are from time to time directly imported from some infected locality); but its eventual recurrence may be confidently predicted, if adequate measures of restriction be not systematically maintained. It is not necessary at this time to do more than mention the part that vaccination and revaccination play in the true prophylaxis of this disease; and we will simply add here, *en passant*, that it is our opinion that bovine lymph is the only virus that can with safety be employed by public authorities, since their aim must be the accomplishment of the greatest possible number of successes with the least possible risk of scandal, such as is sure to arise from any misadventure in this branch of public work. This, we believe, is best attained by the use of the bovine lymph.

With the exception of this special and highly important feature of civic preventive methods, that which will be presented in the following remarks applies with equal pertinence to each of the five constant contagious diseases. The suggestions herein given present concisely the line of operations at present pursued by the department of health of the city of Brooklyn, — methods that have been gradually and in a tentative manner built up from the experience acquired year by year, since 1866,[2] when, for the first time, under the Metro-

[1] Judging from the experience of Brooklyn, a city of 500,000 inhabitants will lose, from all causes, in a period of ten years, over 100,000 lives, of which number not less than twelve per cent may be expected to die from these five diseases.

[2] Prior to 1866 there were city ordinances requiring the reporting of "infectious, contagious, and pestilential" diseases, not specified by name, but commonly considered to apply to those occurring in times of pestilence.

politan Board of Health, it was made obligatory upon physicians and others to make reports of cases of certain contagious diseases, specifying by name cholera, yellow fever, small-pox, and typhus fever.

The present methods have been in operation three years; the diseases now required to be certified being the same as those just named, with the addition of diphtheria (added in 1867), also typhoid, spotted, and relapsing fevers; also, in the early months of this year, measles, having become unusually prevalent and fatal, was added to the list by a resolution of the Board dated Feb. 6, 1880.

The order of the topics herein discussed follows that of the series of questions issued by the American Public Health Association, in a circular dated Sept. 14, 1880, as follows: —

"*A.* What are the best means of securing prompt and reliable information as to the presence and location of cases of such diseases?

"*B.* What are the best means of securing isolation of the first or of single cases of such diseases? and what are the chief difficulties in securing such isolation?

"*C.* Under what circumstances is it proper to declare such diseases epidemic in a place?

"*D.* Under what circumstances is it proper to recommend the closure of schools on account of the prevalence of such diseases?

"*E.* What precautions should be taken at the termination of each case as to —

"*a.* Care and disposal of the dead?

"*b.* Disinfection and cleansing of the room and house?

"*c.* Period of time at which it is safe to allow the convalescent to return to school or society?"

A. Information concerning the contagious diseases is best obtained from physicians. The laws or ordinances should require that the reports of such cases shall be made within a reasonable time, — say twenty-four hours, — with penalty for failure. If the community will pay a moderate fee, the reports will be more surely made. If postal-card blanks, directed to the health officer, stating the information desired, like the accompanying form, —

To the Board of Health, Brooklyn.

BROOKLYN,.....188 .

Name of patient,.....; age,.....
Residence,.....; ward,.....
Disease,.....
Number of families in house,.....
On what floor,.....
Condition of premises,.....
....., M.D.
Residence,.....

Please make immediate report of each case.
All blanks in report must be filled.

Give both first and last name.

All children in the house named in this report are excluded from school attendance; therefore be sure the number of the house is correctly given.

Physicians will greatly aid the work of this office by attention to these details. —

are furnished to physicians, with a request to the latter that they put their report in the nearest post-box, prompt and nearly complete returns would be made without any fee. I say "nearly complete," as there are physicians, otherwise reputable, who will not report their cases if they think they will not be discovered. The chief check or corrective against this rebellious tendency is found in the compulsory registration of causes of death, such as is secured in New York, Brooklyn, and a few other cities under the burial-permit system. In Brooklyn, physicians are required to file their reports of death by contagious disease within twenty-four hours after death. If our postal arrangements might be so amended as to discriminate in favor of these communications affecting the life and health of the public, either by allowing the free passage of such as are marked "official" to the health officers, or by collecting unpaid postage on such at the time of delivery, the tax upon physicians would be lessened, and the reporting of contagious diseases facilitated.

There are, however, some cases not attended by physicians. The law should, therefore, also require reports from parents, keepers of boarding-houses, and from the principals of schools in cases where one of their pupils is attacked, or when children or teachers, though not themselves sick, attend such schools from houses where contagious diseases exist.

The success of this latter requirement must, in great measure, depend upon the good will of these persons, as without medical testimony the nature of the disease cannot be proven. When cases are reported by lay persons, they should, of course, be verified by a medical officer from the health office.

B. Domestic isolation can rarely be depended upon, and for the following reasons: —

1. The want of the proper apartments. The patient will frequently be one of a large family having but two or three rooms, and having no means to obtain more.

2. The mother naturally becomes the nurse of the sick child, and, from the demands of housekeeping as well, must be constantly going to and from the sick-room.

3. A popular impression prevails that all children must have, at some time in their lives, certain of these contagious "children's diseases," as they are sometimes called: and the parents may conclude, that, while one child is sick, the others may as well be; and the latter are therefore allowed to be exposed. This condition of things can only be met by educating parents as to the dangers of such diseases, and their preventable nature.

The difficulties attending domestic isolation above referred to (first and second reasons) must be overcome by the establishment of contagious-disease hospitals in every city, making them so attractive, and placing them under

such guardians, that the people will have confidence in them, allowing mothers to go with their children, and their own physician to attend them. This must not be made a matter of compulsion, or it will fail: but by patient, continuous work, such institutions will in time become popular, and be sought rather than shunned; and then it may be obligatory to send thither all such cases as cannot be satisfactorily isolated at their homes.

C. The official declaration of a disease as epidemic is a question of great importance. The consequence of such a step may become so serious that it should be taken only after a full and careful examination of the subject; and each incursion of the diseases we are here considering, of extraordinary severity, should be judged on its own history, character, and surroundings.

The department of health of Brooklyn has not found it necessary, during recent years, to make such declaration.

D. Whenever the schoolhouse is also the residence of a family in which there is contagious disease, the school should be closed. If, in other cases, the patient is kept from school until neither he nor his clothes are in condition to spread the disease, and the other children living in the infected house are also kept away until such danger is past, there will rarely be any occasion for closing a school.

E. At death the body should be at once disinfected, — say by wrapping it in a sheet wet with a solution of sulphate of zinc and salt (as recommended by the National Board of Health), — and placed in a tight coffin, metallic if possible, and at once closed, and not again opened. The room and effects should be at once fumigated by burning sulphur for at least six hours, one pound to every thousand cubic feet. The funeral should take place within twenty-four hours, and no one be permitted to attend it except those who have been with the child during its illness. The fumigation should also be done in the same manner after recovery.

No definite period of time can be named when a child can with safety return to school: each case must be dealt with individually. In scarlet fever, so long as there is the least desquamation, there is danger; and probably, after all visible desquamation has ceased, the process is still going on. It would therefore be well to consider the patient dangerous for a week at least after visible desquamation has ceased. In diphtheria the difficulties are greater. A week should elapse between recovery — that is, return to normal temperature, absence of sore throat, etc. — before the patient is considered safe. The same rules will apply to small-pox and measles as to scarlet fever.

The method by which diphtheria and scarlet fever have been treated by the Board was in 1880 applied to measles, this disease being by them considered as being far from a trivial one; and, by direction of the Board of Health, a pamphlet was published and circulated, setting forth the suffering that may be inflicted upon a community by a severe type of this disease.[1] The following

[1] Measles not a Trivial Disease: A Report on the Present Epidemic in Brooklyn, and its Treatment by the Board of Health. By J. H. Raymond, M.D., Sanitary Superintendent. Reprint from the Proceedings of the Medical Society of the County of Kings. Brooklyn, N.Y., May, 1880.

statistics are given to show the extensive prevalence and fatality of measles in Brooklyn during the nine months in 1880: —

	Cases.	Deaths.
January	190	9
February	527	15
March	782	32
April	492	34
May	292	32
June	210	21
July	31	6
August	5	3
September	5	0

RESULTS.

Respecting the results attained by this line of management, it is yet too early to speak positively. We feel that good has been accomplished, and that lives have been saved, more perhaps in respect of scarlet fever than diphtheria. The accompanying table is given for the purpose of showing that there has been a decided reduction in scarlet fever, and that this has taken place during a period when the influences that tend to increase its kindred affection, diphtheria, have been at work, and also that in the adjoining city of New York the scarlatinal activity has not diminished. Notwithstanding the rapid increase of this city's population in the ten years last past, the actual total mortality by scarlet fever for 1880 will probably be lower than in any year during that period.

YEAR.	Brooklyn.				New York.	
	Scarlet Fever.		Diphtheria.		Scarlet Fever. Deaths.	Diphtheria. Deaths.
	Cases.	Deaths.	Cases.	Deaths.		
1874	2,448	479	1,651	580	879	1,665
1875	1,923	504	2,669	965	514	2,329
1876	1,666	352	2,329	812	891	1,750
1877	2,796	730	2,280	778	983	951
1878	1,923	383	1,744	544	1,099	1,007
1879	2,173	344	1,779	659	1,477	671
9 months in 1880	930	151	1,470	536		

The following table shows that the plan adopted by the Brooklyn Board of Health is not an impracticable one. (For plan, see report on the management of contagious diseases.[1]) From an experience of more than two years, we

[1] Progress in the Management of Contagious Diseases by the Brooklyn Board of Health. By J. H. Raymond, M.D., Sanitary Superintendent. Pamphlet reprint from Proceedings of the Medical Society of the County of Kings, May, 1879.

are satisfied that it can be carried into effect in every large town and city: —

1879.	
Premises examined where contagious diseases exist	3,032
Complaints against same for defective plumbing	764
Postal cards sent to schools	1,428
Children from infected houses excluded from school	2,976
School-permits issued	1,703
Children returned to school after premises fumigated	3,417
Places fumigated by Board	1,016

Whooping-cough is required to be reported; and upon these reports the children affected are excluded from school, as in the case of the diseases above mentioned: and they require a permit from the Board before they can again attend school.

The sanitary inspectors visit the houses from which the cases are reported, and ascertain if other children are similarly affected. If others are found, they are in like manner kept away from school. This plan has been in force since May, 1880. In the six months from that time there have been sixty-eight deaths from whooping-cough, while in the corresponding period of 1879 the number of deaths was one hundred and eight.

XIV.

MUNICIPAL SANITATION AS PRACTISED IN MOBILE FOR PREVENTING THE SPREAD OF YELLOW FEVER.

By T. S. SCALES, M.D.,
Of Mobile, Ala.

Mr. President and Gentlemen of the American Public Health Association, — At the request of the esteemed President of your honorable body, I have prepared this brief paper, with the above title.

Whatever I may say in relation to the subject in hand will be distinctly understood to have reference to a date not prior to the year 1875, as it was during that year that I became connected with the health department of Mobile; and further remarks will be premised by acquainting you with the authority of the Mobile Board of Health, as shown in the following extracts from the ordinance entitled "An Ordinance to secure Public Health:" —

ARTICLE I. — THE BOARD OF HEALTH.

"Section 1. *Be it ordained by the Mayor, Aldermen, and Common Council of the City of Mobile*, That it shall be the duty of the Board of Health of the city of Mobile, organized under the provisions of an Act of the General Assembly of the State of Alabama, incorporating the Mobile Medical Society, passed in the year 1843 and renewed in 1866, and also in accordance with the Act of the General Assembly passed at the extra session in February, 1875, establishing boards of health in the State of Alabama, to supervise the administration of all the health laws of the city; to examine into all cases of malignant, pestilential, infectious, and epidemic diseases which may occur in the city, and the causes thereof; to examine into all such nuisances as may tend to endanger the health of the city, and to take such steps as may be necessary for their removal; to exercise a general supervision over the sanitary regulations of all municipal institutions, including hospitals, markets, asylums, prisons, and public schools (*provided, however*, that nothing in this section shall be construed as granting privileges in the exercise of which any existing contracts with such institutions would be violated); to superintend all matters pertaining to quarantine and the quarantine physician, and direct all measures of detention, disinfection, and purification of vessels, cargoes, and passengers, coming from ports against which quarantine may have been proclaimed.

"Sect. 2. *Be it further ordained*, That whenever it shall appear to the Board of Health that any pestilential or infectious disease has made its appearance in the city, said Board shall take such measures as to them may seem expedient and requisite to prevent the spread of such disease; and any person failing to comply with the requirements of the Board of Health in all such cases shall forfeit and

pay such fine as the mayor may impose, not exceeding fifty dollars: that no person laboring under any contagious, infectious, or other disease dangerous to the public health, shall be removed from one place to another within the city limits, without the permit of the Board of Health, under such penalty as the mayor may impose, not exceeding fifty dollars.

"SECT. 3. *Be it further ordained*, That it shall be the duty of every physician, or other person practising medicine in the city of Mobile, to report to the Board of Health every case of small-pox, yellow fever, or other infectious, contagious, or pestilential disease which he may be called upon to treat within the city limits, said report to be made within twenty-four hours after he shall have ascertained the character of the case, and to specify the name of the patient and the locality of the house in which such person is to be found; and for every violation of this provision the guilty party shall forfeit and pay such sums as the mayor may impose, not exceeding fifty dollars: that every citizen upon whose premises there may occur any case of small-pox, yellow fever, or other infectious or pestilential disease, not under the charge of any physician, shall in like manner report the facts to the Board of Health, under such penalty for failure so to do as the mayor may impose, not exceeding fifty dollars. But whenever any disease has become epidemic, the Board of Health may at their discretion declare it unnecessary to report further cases.

. . . . . .

"SECT. 7. *Be it further ordained*, That the health officer shall be the executive officer of the Board of Health, and, under the direction and control of the Board of Health, shall exercise a general supervision over the sanitary interests of the city; that he shall make a circuit of observation at least once a week to every part of the city; that in all cases where he may discover the existence of any agent which might prove dangerous to the health of the city, he shall cause any ordinance in existence for its correction to be enforced; that, if there be no ordinance in existence competent to the correction of the evil, he shall make a full report of all the attending circumstances to the Board of Health, accompanied with his opinion of the necessity of extraordinary or special action; that he shall make diligent inquiry into all cases of malignant, infectious, or contagious diseases which may occur in the city, cause immediate measures to be taken to arrest their progress, and report the facts to the Board of Health; that, if any person shall neglect or refuse to comply with the requisition of the health officer, or any member of the Board of Health, to examine the yards, lots, or out-houses of any person in which there is cause to believe that nuisances or pestilential or infectious diseases exist, he shall be fined such sum as the mayor may impose, not exceeding fifty dollars.

. . . . . .

"SECT. 12. *Be it further ordained*, That the city pest-house shall be conducted under the direction and control of the Board of Health and the supervision of the health officer, subject to the approval of the mayor and the Joint Hospital Committee, or a majority of them; and care shall be taken to keep the building in proper repair, and ready for reception of patients: that whenever, in the judgment of the Board of Health, it becomes necessary to open the pest-house for the reception of persons afflicted with pestilential or contagious diseases, the Board of Health shall communicate the fact to the mayor, together with such recommendations as the occasion may seem to require; that, if the mayor grants the requisite authority, the Board of Health shall proceed to employ a physi-

cian to the pest-house, together with such other attendance as may be needed, to procure all necessary supplies by a requisition on the mayor and Joint Hospital Committee, and to prescribe the rules and regulations for its efficient management; that the health officer shall keep a book, to be entitled 'The Register of the City Pest-House,' in which shall be registered the names, ages, sex, colors, nationalities, diseases, dates of admission, dates of discharges, deaths, and recoveries, together with such other detail as the Board of Health may think proper."

In addition to the authority vested in the Board of Health, it will be observed that the ordinance requires that *all* cases of infectious or contagious disease shall be reported at the office of the Board of Health within twenty-four hours after the nature of the same shall have been determined upon: consequently very little difficulty is experienced in acquiring knowledge of such cases when existing in our midst.

With these few preliminary remarks, I will proceed to furnish you some facts in relation to the occurrence of yellow fever in Mobile, and the measures adopted to prevent its spread, together with some desultory remarks on the same.

During the year 1875 there occurred in this city sixteen cases of the disease, with a mortality of fifty per cent, the first case presenting on the first day of September, and the last about the twentieth day of October. The methods adopted in 1875 can as well be furnished you by submitting the following extract from our annual report of that year: —

"It is true that there were about sixteen cases of fever reported in the city, with seven deaths: but, so far, no connection whatever can be traced between these cases and any foreign origin; and in every case, after death or recovery, the clothing was treated with boiling water. Copperas and carbolic acid were freely used about the premises, and infected portions of the buildings subjected to fumigation with burning sulphur; and the entire square, and those adjoining, were disinfected with copperas and quicklime."

Though, as stated in the extract, we could trace no connection between fifteen of the sixteen cases occurring and any foreign origin, we did not presume to assert that there really existed no such connection; though certainly the fifteen cases had no connection with the sixteenth, as demonstrated by the fact that the sixteenth case did not arrive in Mobile until one day after the death of the first case, and none of the fifteen cases occurred anywhere in the neighborhood of where the remaining case was. The word or number sixteen is here used without reference to the order of occurrence.

In the following table of deaths from yellow fever in Mobile in that year, a note is made to the effect that the patient spoken of as the sixteenth case contracted the disease in Pascagoula, Miss., and was brought to this city at night on the eighth day of September, from whence he was transferred to the small-pox hospital the next morning: —

STATEMENT OF YELLOW-FEVER DEATHS OCCURRING IN MOBILE DURING THE YEAR 1875.

"Mary Eberhart, aged 14 years; contracted at the south-east corner St. Louis and Lawrence Streets, Sept. 1; died Sept. 7.

"Barbra Eberhart, aged 14 years; contracted at the south-east corner St. Louis and Lawrence Streets, Sept. 5; died Sept. 11.

"Joe Peter, aged 22 years; contracted at Pascagoula, Miss., Sept. 5; died Sept. 11. The patient was brought to the city at night of the 8th of September, and made his way to the guard-house the next day, from whence he was transferred to the small-pox hospital, where he expired.

"Christina Eberhart, aged fifteen years; contracted at the south-east corner St. Louis and Lawrence Streets, Sept. 20; died Sept. 27.

"Mrs. F. B. Nash, aged forty years; contracted on Franklin Street, between St. Louis and St. Michael, Sept. 25; died Oct. 4.

"George Toenes, aged seven years; contracted at the corner of Franklin Street and Davis Avenue, Sept. 26; died Oct. 3.

"Mary Ingalls, aged ten years; contracted at the corner of Walnut and Gracie Streets, Oct. 19; died Oct. 24.

"Amanda Bailey, aged twenty-seven years; contracted on Claiborne Street, between Adams and Lipscomb, Oct. 20; died Oct. 25."

On this point I also present an extract from the annual report of that year, as follows: —

SMALL-POX HOSPITAL.

"Since taking charge of this institution, it has been kept constantly open and in condition for the reception of patients. It is of great importance that this condition of affairs should continue, for the reason that at any time, for the security of the public health, it may become necessary to remove to this point a case of contagious or infectious disease, as was done in the case of the patient with yellow fever transported to this city from Pascagoula, Miss., in September last.

"The epidemic of small-pox, alluded to in another portion of this report, was suppressed in a masterly manner by my energetic predecessor; so that, on taking charge in May, we had only to contend against some scattered cases: and now, for more than three months, not a case has been reported in the city.

"Our method of combating this disease has been the same as was adopted by your former executive officer; to wit, a yellow flag was displayed whenever a case manifested itself, in order to warn unprotected persons. Those in the immediate vicinity who were unprotected, from not having been previously vaccinated, were required to be vaccinated; and, after death or recovery of the afflicted, such appurtenances of the contaminated apartments as were not consumed by fire were treated with boiling water; and the apartments themselves were fumigated with burning sulphur, remaining closed for twenty-four hours after the fumigation, and the flag remaining displayed for four days after the fumigation."

In relation to the patient so frequently alluded to as the sixteenth case, I would state that his lodging-place during the night of his arrival here was ferreted out, and his baggage found, which, being of a worthless nature, was destroyed, and his place of lodging fumigated and disinfected with burning sulphur, carbolic acid, copperas, and quick-lime.

During the year 1876 there occurred in this city only two cases of yellow fever, — both at the Battle House.

The first was in the person of a commercial agent for a house in Cincinnati, who arrived in Mobile sick with the disease, and died about ten P.M. on the ninth day of September. During his sickness, isolation was enforced and disinfectants employed; and, after his death, the body, having been placed in a metallic coffin, was interred before day, on the morning of the 10th, in our cemetery, where it remains to this day, though letters were received from different parties at the time of death asking that it at once be forwarded home. Our reasons for not complying will at once be manifest to you all.

All the material about the room that could be subjected to boiling water was so treated, with the addition of a five-per-cent solution of Calvert's No. 5 carbolic acid. Material that could not be so treated was most thoroughly disinfected with sulphurous acid gas; and the infected room, after being subjected to the sulphurous acid gas disinfection, was closed, and kept closed until the advent of cold weather.

The second case was in the person of a merchant from Savannah, Ga., who contracted the disease there, and, arriving at the Battle House on a business visit here, summoned medical assistance; but, it being then about the latter part of December, no precautions were taken.

An extract from annual report for 1876, given below, furnishes in substance what I have just stated: —

"It is true that, during the year 1876, there occurred in this city two cases of sickness of such a nature as to excite the strongest suspicion. The first was that of a Mr. Reese, who was a travelling agent for a house in Cincinnati, and came to Mobile sick from New Orleans, about the 5th of September. After having been sick in this city for four days, he died about ten P.M., Saturday, Sept. 9. His remains were placed in a metallic case early Sunday morning, and interred in Magnolia Cemetery; and the room, bed, clothing, and every thing about the room were immediately thoroughly fumigated and disinfected.

"You observe that the period of this man's death antedates by twelve or fourteen days the employment of detectives on the New Orleans, Mobile, and Texas Railroad, and occurred at a time when it was not positively known that yellow fever existed in the city of New Orleans.

"The second case of suspicious nature was that of a gentleman from Savannah, who, on a visit here, was taken sick during the latter part of December, at a time when there no longer existed any fear of the disease; and, as he recovered, of course very little was said about the case."

From 1876 to the present time the city of Mobile has escaped entirely a visitation of yellow fever, with the exception of the year 1878, when it prevailed in the Southern States to an extent hitherto unknown in the annals of our country. That year, however, our city escaped, through the mercy of a kind Providence, to an extent far surpassing our expectations, as there occurred only 297 cases with 83 deaths, being a mortality of nearly 28 per cent.

In 1878 the first case recognized was in the person of a mulatto female,

thirty-nine years of age, residing on the east side of Claiborne Street, second south of Adams Street. This person attended an excursion to Biloxi, Miss., from Mobile, on the twenty-fourth day of July, when she met an excursion party from New Orleans, and returned to Mobile on the night of the same day. I shall have occasion, further on, to express a very strong belief that this was not really the *first* case of yellow fever that occurred in Mobile that year; and from the fact that the woman had only been to Biloxi a portion of *one* day, that there certainly was no yellow fever at Biloxi, that we did not even know positively of the existence of the disease in New Orleans at that time, and the long period intervening between the visit to Biloxi (July 24) and her sickness in Mobile (Aug. 11), considerable doubt was entertained as to its being a case of yellow fever. However, as soon as the case was officially reported, a policeman was stationed at or near the house, with instructions not to allow ingress on the part of any one save the physicians and nurse, if one was desired, and egress to her medical attendants only.

This measure was not long required, as death with black vomit very soon put an end to her earthly career; and in less than six hours after death she was interred, and every thing in the building, except some cheap jewelry, committed to the flames. Carbolic acid and copperas were freely used in the privy into which had been thrown the woman's ejecta and dejecta during life; and the building was thoroughly fumigated by means of sulphurous acid gas. The entire square in which this case occurred was then subjected to a liberal supply of copperas and carbolic acid, as well as quick-lime.

Ten or twelve days having elapsed without the occurrence of a second case, I was about to console myself with the belief that either the first case could not have been one of yellow fever, or by our radical treatment the germs had been destroyed, when subsequent events proved to the contrary; a second case having been reported as contracting the disease on the twenty-eighth day of August, on the west side of Jackson, between Congress and Adams Streets, in the same square with the first case, and directly east. This case terminated in death also, and the same measures were adopted as mentioned in the first case.

From the eleventh day of August to the twenty-second day of September there occurred ten cases, in each of which we continued the fight by means of municipal sanitation in the way of isolation, house-quarantine, disinfection, fumigation, etc. Then the Board of Health saw fit to rescind the order requiring the quarantine of infected houses. This measure I opposed at the time, and am now much gratified at being able to quote the views of so able a sanitarian as Dr. Cochran in support of my position.

In his article on quarantine, published this year in "Circular No. 3 of the Alabama State Board of Health Transactions," Dr. Cochran writes, —

"The scheme of municipal quarantine here recommended, so far as its general principles are concerned, contains nothing new, although, so far as I know, it has not heretofore been so systematically developed and vindicated. But the strange thing is, that no systematic and earnest effort has ever been made to put it into

practice in the attempt to suppress an epidemic of yellow fever. The best example of this sort of work that I have any knowledge of was done in 1878 in Mobile. Here, for some six weeks, the Board of Health resisted the progress of the pestilence step by step and house by house; and during that time, it seems to me, they are entitled to the credit of having fairly held it in check: at any rate, the number of cases developed within that time was singularly small. But the fever did make some progress, and the few cases that did occur were scattered here and there over several squares; and the Board finally yielded to unwise counsels, and abandoned the contest. In my opinion, if they had continued throughout the epidemic season the policy of the first six weeks, the number of cases and the number of deaths would have been diminished by at least seventy-five per centum of the number actually reached."

After the order relieving the infected houses of quarantine restrictions, of course there followed free and unrestricted intercourse between the well from all portions of the city, and the sick in one restricted portion, which resulted in the conveyance of the germs of the disease to all quarters of the city; and, in my opinion, nothing then saved us from a most terrible epidemic but the advent of cold weather, though the spread of the disease was doubtless to some extent retarded in consequence of measures still adopted, as already reported.

For the purpose of rendering these measures more efficient, circular letters were addressed to the physicians of the city, and blanks furnished for the reports of their cases and results of the same, in order that we might keep thoroughly posted as to the existence of the disease, and acquire such information as would be of interest in its history.

Having given the methods adopted to prevent the spread of the disease, and the apparent, if not real, good results of the same, I will now, in accordance with the request of your honored President, make some remarks in relation to my opinion in the premises.

I fully indorse every measure taken by the Mobile Board of Health, except the order rescinding the house-quarantine restriction, which, as already stated, was opposed by me at the time.

I think, that, on the appearance of the first case of yellow fever in a city, if possible, it should be at once sent to the quarantine hospital, and a system of fumigation and disinfection similar to that mentioned in this paper should be practised. If, from any cause, the patient cannot be so disposed of, my opinion is, that the infected house should be plainly designated by either a printed placard or distinctive flag, and preferably the latter. An acclimated officer should be posted in immediate proximity to the infected house, with instructions to allow no ingress whatever except to medical attendants, and not even to these if it could well be avoided, and ingress only to such nurse or nurses as may be designated by said attendants and the attendants themselves. The sick in the infected house should be isolated as much as possible from the well, and disinfectants of a suitable character liberally used about the sick-chamber.

After death or convalescence, the most thorough system possible of fumigation and disinfection by burning sulphur, boiling water, etc., should be employed; and the body, if death be the result, should at the very earliest moment be afforded *private* burial, and not be disinterred until the appearance of cold weather. Should, for any purpose, disinterment be desired, the entire neighborhood of the disinfected building should be thoroughly overhauled, in a sanitary point of view, and a solution of sulphate of iron, or some other approved disinfectant, employed. Quick-lime, strewn about the various premises in no sparing manner, can do no harm, and may accomplish some good.

The application of carbolic acid for the disinfection of lots or squares, as applied in Mobile, if of sufficient strength to accomplish any good, has acted so deleteriously on the residents of the vicinity where applied as not to impress us with any striking belief in its favor: therefore, in its application, more dependence has been placed upon its virtue when compounded with boiling water, say in a five-per-cent solution of Calvert's No. 5.

The measures here proposed are in substance those adopted in Mobile, in 1878, during the first six weeks of the existence of the disease, and are such as I would recommend to be enforced in every case until the disease became generally epidemic, and clearly beyond control by human effort.

Earlier in this report I expressed some doubt as to whether the first case officially reported in 1878 was really the first case that actually occurred. My reasons for this belief will now be presented, and you can draw your own inferences. Toward the close of the disease it was rumored that still another mulatto female had in all probability been an important factor in connection with the appearance of yellow fever here.

This mulatto female went from New Orleans to Biloxi with excursionists from the former city on the twenty-fourth day of July, and came to this city with the Mobile excursionists that night, was taken sick in a few days after her arrival here, and was visited frequently during her sickness by the subject of the first case officially reported. Near the termination of her sickness, which resulted in recovery, she was seen by one of our most experienced physicians, who afterward stated to me, that, in all probability, she might have had a very mild attack of yellow fever; if so, however, as it was in the person of a yellow woman, so late in her attack and of so mild a type, his ignorance of the existence of the disease in New Orleans, and not even suspecting it at the time, must be his excuse for not detecting the same. I now know, however, that the gentleman alluded to above really believes that this was a case of yellow fever. I would also here state, that at the time this case occurred, though yellow fever existed in New Orleans, our Board and the entire medical faculty of this city were completely ignorant of the fact.

With the suspicion existing in relation to the doubtful case, we immediately set to work investigating the same. The woman, who in the meantime had returned to New Orleans, was interviewed; and Dr. Cochran, who was then in New Orleans, was enlisted in the investigation, the result of which was, that

the woman, on her arrival in Mobile from New Orleans on the night of the 24th of July with the Mobile excursionists, came to us direct from a double-tenement house, in one-half of which, though not the half occupied by her, there was at the time a patient sick with yellow fever. With these facts before us, there can be no question in my mind as to this being the first case in Mobile in 1878, and the origin of the disease here that season.

I am equally confident, that, had this fact been known at the time, and similar measures pursued as were adopted with the first case officially reported, considerable, if not complete, progress would have been made in stamping out the disease at its very outset.

XV.

THE RESULTS OF ATTEMPTING TO CHECK THE SPREAD OF SMALL-POX IN CHICAGO.

By O. C. DE WOLF, M. D.,
Health Commissioner, Chicago, Ill.

One hundred and forty-seven thousand immigrants have been received at and distributed from Chicago during the year 1880. Unlike ports of entry on the seaboard, where these strangers may be quarantined and provided for until ready to forward, Chicago receives them on their transit to the North-West from four different lines of railroad, and permits them to disperse themselves about the city at their pleasure. The passage from European ports is now so rapidly made that the individual may contract small-pox two days prior to taken ship at Bremen, for instance, and find himself in Chicago before the eruption has arrived. In this manner small-pox has been brought to this city (Chicago) six times during the past year. Again, Chicago has received, as a permanent accession to her population, thirty thousand souls each year since 1877.

This cosmopolitan multitude of immigrants and citizens received each year environs this city with a peculiar peril when exposed to incursions of small-pox, and should be remembered in a review of the subject as applied to Chicago.

As a basis for the discussion of the subject, and a statement of the views I entertain, and methods employed in this city for preventing the spread of small-pox, I offer the following propositions, which may form a conclusion to this note: —

1. All physicians and householders should be required by law to report, on first knowledge, to the proper authorities all cases or suspected cases of small-pox.

2. When, from local condition or general prevalence of the disease in locations accessible to our population, there is reason to fear a troublesome invasion of the disease, *every* case discovered before the suppurative stage should be removed to the hospital, and every house in which a patient is found at a period too late for removal — i.e., after the suppurative period has commenced — should be continuously guarded by a police-officer until the patient is dead, or removed from surveillance.

3. The following precautions should be taken in regard to disinfection: —

(*a*) The body, immediately after death, should be wrapped in a sheet satu-

rated with fifty per cent solution of carbolic acid, closely coffined, and buried under police direction.

(*b*) The house, furniture, and clothing from which the dead or the living have been removed should be fumigated with sulphurous acid gas or chlorine gas, and remain under police observation for eight hours.

(*c*) The convalescent, before leaving hospital or domicile, should receive several warm disinfecting baths, paying special attention to the hair; and, if from the hospital, all clothing should be perfectly fresh or fumigated.

4. When general infection is feared, general vaccination should be compulsory and vigorously executed, if necessary, by police-power.

I am of the opinion that Chicago has escaped an epidemic of small-pox twice during the past four years by a faithful execution, to the utmost detail, of the above programme; although in one instance (1878) I received more censure from a portion of the press and from some citizens than for any sanitary service I ever performed, one daily paper counselling the citizens to "shoot down the health officers like dogs if private domiciles were invaded."

The result, however, justified the means; and compliments all around terminated the labor. There have been but three instances during the past four years, so far as I am informed, of failure to report cases of small-pox. On each occasion the attending physician was brought before the courts and fined fifty dollars.

On receipt of notice of small-pox, a medical officer is immediately despatched to investigate the case; and if, in his judgment, removal is proper, he telephones the fact to the central office, and the ambulance is hastened to the location. The isolation of the afflicted by removal to the hospital was in some cases strenuously opposed by the patient or family, who insisted that, under our form of constitutional government, such removal, when compulsory, was a violation of the law, and inconsistent with the preservation of personal liberty.

In 1877 the following ordinance was prepared by Corporation Counsel (now Judge) Anthony, and immediately adopted by the city council: —

ORDINANCE.

Be it ordained by the City Council of the city of Chicago,—

SECTION 1. Sect. 4, chap. 17, of the Revised Ordinances of the city of Chicago, compilation of 1873, is hereby amended by the addition of the following proviso: —

Provided, That in case such health officer be resisted or opposed in making such removal of any person so affected with an infectious or pestilential disease, the person or persons so opposing or resisting such health officer shall be fined therefor not less than twenty-five dollars nor more than two hundred dollars; and such health officer, whenever it shall become necessary in order to make the removal of any person so affected with any infectious or pestilential disease, as provided for in the section to which this is an amendment, is hereby authorized, empowered, and commanded to break open the door or doors of any house in which such sick person is, and to use such force as may be necessary to effect

such removal. And the police department of the city shall, when requested, furnish the health officer with all necessary assistance.

SECT. 2. This ordinance shall be in force from and after its passage and due publication.

In my opinion, the power delegated to the municipal authorities by this ordinance is beneficent and salutary. The propriety in all cases, and the absolute necessity in many, of the isolation secured by hospital is too well understood by this body to require discussion. On several occasions it has been necessary to call upon the police-force for aid in removing a patient, but in all cases removal was made when attempted. I have sought to overcome this opposition by supplying such accommodation at the hospital as would command the attention and approval of all persons admitted, and with such success, that, during the past year, all citizens afflicted with this loathsome disease have demanded as a right to be admitted to the hospital.

To this date (Nov. 15) there have been reported in the city during the year 191 cases of small-pox: 182 have been removed to hospital, and 9 have been quarantined at home. Of this number (191), 31 have died, — about 16.2 per cent.

The nine cases remaining at home were continuously guarded by police-officers, who had entire control of the domicile, superintending all going in and coming out, until the case passed from observation. In case of death the body is treated and funeral conducted as before indicated.

When the ambulance is ordered to the house to remove a case of small-pox, it is accompanied by an officer, who is assigned to the duty of fumigation.

He carries a leather pannier, which contains packages of brimstone, rolls of stout paper three inches wide, a pot of paste with brush. The rooms or section of house occupied by patient are prepared for fumigation by raising the carpets and hanging on lines stretched across the room, on which is also hung all clothing, bedding, etc., supposed to be infected.

The crevices about windows, doors, floor, or wherever found, are securely covered by the strips of paper.

A tub containing two or three inches of water is placed in each room, into which a shallow iron vessel is deposited, on bricks, which raise the vessel just above the surface of the water.

A sufficient quantity of brimstone is thrown into the vessel, and two ounces of alcohol sprinkled upon it to insure combustion. Fire is applied, and the fumigator retires, pasting the door of exit on the outside.

He remains in charge of the house eight hours. If the house is small, or the entire house needs fumigating, the occupants are removed for the operation.

The process has proved entirely satisfactory. Sulphurous acid gas is preferred to chlorine gas on account of its cheapness, and the ease and certainty with which it can be generated.

The convalescent, before leaving hospital or domicile, receives several baths

or scrubbings in a warm five-per-cent solution of carbolic acid, special attention being paid to the head. All clothing, before leaving the hospital, is thoroughly fumigated in the close brick fumigating-chamber connected with the institution.

There are fifty-four thousand children attending the public schools of Chicago. A necessary condition of admittance, at the commencement of each school year, is the presentation of a certificate from a physician licensed by the State Board of Health, that the bearer has either been successfully vaccinated by the subscriber, or that he bears evidence of such successful vaccination. During the first fortnight of school every child is re-examined by the medical officers of the health department. If the evidences of vaccination are not satisfactory to this officer, the child is returned to his parent or guardian with a statement, and a revaccination requested. In 1879 twenty-seven hundred children were thus returned to their homes, and only re-admitted to school upon the certificate of the health officer.

No child of school age, and attending the public schools of this city, has been afflicted with small-pox during the past three years.

Wherever small-pox is found, all the occupants of the infected house, and also of two blocks each way adjoining, are vaccinated; and, when more general infection is feared, whole neighborhoods are canvassed. Since it has become generally known that nothing but bovine virus is used by this department, there has been no difficulty in securing vaccination to any extent desired.

By municipal ordinance, vaccination is made compulsory whenever the commissioner of health orders it; and I conceive it to be the duty of the State to take charge of this matter, for it is altogether too important to be left to the caprice of the individual.

XVI.

MEMPHIS SANITATION AND QUARANTINE, 1879 AND 1880.

By G. B. THORNTON, M.D.,
President Memphis Board of Health.

The history of sanitary medicine offers few, if any, examples in this country where greater necessity existed for reform in sanitation, or more marked results have been accomplished in the same length of time under more adverse circumstances, than in this city. The sanitary condition of Memphis, its defects and advantages, together with a brief statement in regard to its change of government by the State Legislature in January, 1879, involving an abolition of its charter, with the offices of mayor and city council, and the substitution of the less complex and more efficient legislative council, have been briefly detailed in the first annual report of the present Board of Health in February, 1880. They were both peculiar: this radical change of local government followed a few months after one of the most destructive epidemics of yellow fever known in history. Scarcely had the work of re-organization been accomplished, and the new Board began to realize practical results from its operations, than, with the advent of warm weather in July, the outbreak of yellow fever in three different localities announced the commencement of another epidemic, which would have proven as disastrous as its predecessor, had it not been arrested by repressive measures, depopulation, and quarantine restrictions.[1]

This diversion necessarily interfered with the general plan of sanitation indicated, and then in active process of execution. The general suspension of business incidental to panic, followed by depopulation, quarantine, and work pertaining directly to the epidemic of 1879, continued until late in October. Consequently the task of removing all known or supposed local causes of a return of the disease the following year had to be perfected as far as practicable in the short space of seven months.

THE SANITATION OF MEMPHIS.

It has been asserted by those who professed to be competent witnesses, and whose position entitle them to respectful consideration, that the city presented some of the most unsanitary features to be found to exist in any city of its size in the country. Be this as it may, in view of the fact that yellow fever

[1] See paper on Yellow-Fever Epidemic in Memphis, 1879, in vol. v., Reports and Papers of Public Health Association.

had been epidemic four different times during the period of twelve years, on three of which occasions it was known to have been imported, and on each occasion it continued until after frost, and that the death-rate, as shown by official records, was higher than the average of other cities, independent of epidemics, the weight of evidence would rather support the assertion that local conditions favored not only the spread of exotic diseases when introduced, but maintained a high death-rate from endemic diseases. One fact is undeniable: the city obtained a notoriety which was any thing else but agreeable to its citizens as a place of residence, or conducive to their interests as a place of business. It is true of a place as of an individual: prejudices once acquired from an evil reputation so mar its good qualities, that it is not likely to get full credit for what good it does possess. Bare assertions, unsupported by facts, which time alone can verify, will not remove impressions once fixed. I maintain that the problem of the sanitation of Memphis is now solved; and it is practically reclaimed from those factors which entered so largely into its unsanitary condition, and acquired for it such an objectionable reputation for insalubrity, that, so far from its being simply on a par with other cities in the Mississippi Valley, it is in the advance, not only in the accomplishment of its work (though that is not by any means perfected), but in a proper sense of what is essential to the maintenance of an effective sanitary system. While nature has done a great deal in the topography of the site on which the city is built, it required the intervention of art well directed to remove many existing defects. Its elevated position and natural water-sheds afford advantages for drainage not inferior to those possessed by many cities of its size more favored by a lower death-rate.

The elevation in front of the city, being at an average of forty-seven feet six inches above high-water mark of the Mississippi River, which has a fall of thirty-six feet to extreme low water, affords a mean average of thirty-four feet the year round. In addition to this, Bayou Gayoso, with several auxiliary branches, commencing in the south-eastern portion of the city, runs a north-westerly direction nearly through its geographical centre, and empties into Wolf River, about half a mile above its confluence with the Mississippi River. The length of these bayous inside the corporate limits is about five miles, and affords ample fall for thorough drainage. But these, with other natural advantages, alone proved inadequate to the occasion as the city grew in population, and its soil became saturated with decomposed animal and vegetable impurities. Surface-drainage alone is inadequate to the prevention of those deleterious miasms incidental to the easy absorption of noxious fluids, and results have proven that these advantages alone were too much relied on as a proper security against either the occurrence or spread of disease.

The high death-rate accredited to Memphis is not due so much to its climatic influences and natural unsanitary condition or surroundings as to other influences which are preventable, and many of which have been within the past year, and are in process of being, removed.

Without mentioning specifically or going into a detailed description of those

factors which were considered the prime objects of offence, I will merely state in a general way that there had been too little attention paid to sanitary matters by those in authority, they, like a majority of the population, not appreciating the necessity for special sanitary interference ; and, while many portions of the city were unobjectionable in appearance, a great portion was built without any regard to the simplest rules of sanitary science. Many houses were built at a time when the rudest habitations yielded handsome returns upon such investments, and were made to answer the purpose of properly constructed houses. A large majority of these habitations were occupied by a class of people least likely to observe habits of cleanliness, or to have concert of action with those who were so disposed. Previous to the existence of the present government, no ordinance or law existed requiring some regard as to sanitary arrangements in the construction of houses, either for business or residence purposes. In 1868 ten and three-quarter miles of wooden-block pavement was completed on the principal streets. It was subjected to the attrition and wear of the heaviest character of transportation, with no effort towards necessary repairs in places where it showed decay. Constantly disturbed by repairs to street railroad, laying gas and water pipes, and improperly replaced, its surface was soon rendered uneven, and never systematically cleaned. Washing rains or storm-water alone occasionally removed daily accumulations. During the summer months, to prevent the inconvenience of dust, it was kept constantly sprinkled or wet: consequently the blocks were in many places saturated with water, made additionally deleterious by the admixture of animal and vegetable impurities incidental to crowded populations. In addition to this surface pollution, there was a constant underground sipage from the contents of privy-vaults, cesspools, and underground drains, with improper outlets. The water-supply, in many instances obtained from defective cisterns and wells, was rendered impure from these causes. These, in combination with other influences common to all cities with populations crowded together, in a climate requiring a period of residence for acclimation for many of its newly acquired citizens, were causes sufficient to account for the high death-rate accredited to Memphis. In addition to this, it being located about the centre of the Mississippi Valley, on the direct line of water transportation from the North to the South, — a railroad centre for long lines of roads, a commercial centre for an extensive radius of country, — afforded a combination of interest to induce a large floating population, the migratory carriers of any infectious disease which might exist in the country. These are circumstances calculated to subject the place to severer tests of health preservation than ordinarily fall to the lot of cities of this class. By the census of 1870 the population was 40,226 : whites, 24,755 ; colored, 15,471. The city limits were contracted March, 1870, before this census was taken, which was not commenced until June, 1870. It has been erroneously stated that this census was taken after the corporate limits were contracted.

By the census of 1880 the population was 33,526 : whites, 17,690 ; colored, 15,836.

The total number of deaths for the first ten months to Nov. 1 was 807: whites, 388; colored, 469, — which makes a death-rate per 1,000 of total population, 24.4: for whites, 19.1; and colored, 33.6, — a decided reduction on preceding non-epidemic years, which I think may be fairly attributed to an improved sanitary condition, though this reform has not existed a sufficient length of time to state definitely what good results may be ascribed specifically to it, though I think it may be fairly assumed that the death-rate will be reduced at least 25 per cent during the next twelve months on those diseases which are regarded as preventable.[1]

This being conceded, the interesting question to the sanitarian arises, What has been done, and what is in contemplation for the future? The reforms necessary to meet the demands afford a field of operations at once full of interest as a scientific problem, and of vital importance to those interested from a business or social stand-point.

After the epidemic of 1873, more attention was paid to sanitary affairs. The Board of Health was re-organized, a voluminous health ordinance adopted, which seemed sufficiently explicit and comprehensive to meet the requirements; but, whether from want of due appreciation of its necessity, or from want of proper support by the law-making and executive power, practical results for good do not seem to have been accomplished. But this should not be charged upon either the former city government of Memphis or its health authorities as designedly a dereliction of duty, or as a want of due appreciation peculiar to them. The wide-spread and destructive epidemic of 1878 aroused an interest throughout the whole country in sanitary affairs previously unknown, and was the direct influence which created the National Board of Health.

[1] Death-Rate per Thousand Population. (Estimated at 40,000, — one-third colored.)

Years.	Total Deaths.		Annual Mortality.	Proportion to Population.	
	White.	Colored.	White and Colored.	White.	Colored.
1874	643	546	29.7	24.1	40.9
1875	681	584	30.2	25.5	43.0
1876	666	612	31.9	25.0	45.1
1877	661	612	31.8	24.8	45.1
1878*	2,438	1,523	99.0	92.0	114.2
1879*	818	755	39.3	30.6	56.6

The above table is compiled from the official records of the health office, based upon a population of forty thousand, which was the estimate in 1870, as shown in the national census of that year; also by the City Directory of the past year, and as adopted by Hon. John Johnson of the State Board of Health.

It makes the death-rate lower than reported by the National Board of Health; but that report was based on a population of 30,659, which I think is too low. — *From Annual Report of Board of Health for year ending February, 1880.*

* Epidemic years.

Since then the interest developed in public and domestic hygiene has been greater than ever before in this section. Memphis, being about the worst-scourged place in 1878, and the only one of any note attacked in 1879, attracted especial attention; and the country at large in no unmistakable terms demanded, that, if there existed local conditions which induced or maintained this unfortunate susceptibility to epidemic disease, no effort should be left untried to remove those conditions.

It being apparent that the further growth of the city or extension of its commercial interest would not only cease, but a rapid decline in all elements of wealth would follow as a consequence of these recurring visitations of infectious disease, the practical question arose, What was best to be done? and, that being decided, the best and most expeditious means of accomplishing the work? As some of the most lasting lessons are taught by saddest experiences, it seems that great and permanent good to Memphis will be the direct result of its reverses. Other communities have been benefited by the experiences of Memphis, and its example has afforded an impetus to city sanitation heretofore unknown.

That this interest in local sanitation, quarantine, and all subjects pertaining to public hygiene will be increased, and develop a better understanding among separate communities, a greater facility in conventional action, a higher standard of hygiene throughout the country, there can be no question.

As above stated, the outbreak of yellow fever in Memphis in July, 1879, arrested the operations of the Board of Health in some of its work of sanitary reform, which had been indicated in a general way soon after it began to get practical results. These plans, though hardly commenced, embraced all the general principles which have since been largely developed, and are in active process toward completion. Credit is due to the National Board of Health for facilitating this work by making a thorough inspection and sanitary survey of the whole city during the past winter and spring, and indicating specifically what was most demanded. During the progress of this inspection, detailed schedules of nuisances and unsanitary conditions were made to the local Board of Health, which facilitated its work very much. In addition to the practical good accomplished, it had a moral effect, and enabled the local health authorities to accomplish more than otherwise would have been done in the same length of time. The leading features aimed at, and in the main accomplished, in this sanitary reform, have consisted in cleansing the city of all objectionable accumulations, and the prevention of re-accumulations, by the operations of a public garbage service, which disposed of all such garbage by throwing it into the Mississippi River at a designated point below the city, where there is a deep and strong current at all stages of water; the abolition of all privy-vaults, cesspools, and improperly constructed underground and surface drains, and the substitution of a complete system of sewers and subsoil drainage-pipes; the destruction or renovation of unsanitary houses; the removal of the saturated and decayed wooden pavement; the improvement of the water-supply; and a rigid enforcement of the health ordinance,

both in regard to public and private property, including the improvement of Bayou Gayoso, which affords the natural drainage for two-thirds of the western, the centre, and all of the eastern portion of the city. The character of the soil and general topography of the ground facilitated the construction of sewers and laying subsoil drainage-pipes. For a detailed description of this system, see a paper read by Col. George E. Waring before this Association Nov. 19, 1879, at its session in Nashville, and published in vol. v. of its proceedings; also Supplement No. 3 to current number of "National Bulletin of Health," Feb. 24, 1880. See also in current numbers of "The New York Sanitary Engineer" for Oct. 15, p. 442, and Nov. 1, 1880, p. 647.

The practical working of the sewers [1] is giving entire satisfaction, and, as far as I know, fully answering the ends claimed for it by its projector. The chief advantages of this system over the ordinary sewers of other cities are the economy in first cost, the prevention of sewer-gas to its minimum, the exclusion of storm or surface water, and their facility in cleansing themselves, or in the prevention of the deposit of sewage-matter in any portion of the pipe. The periodical flushing by an automatic arrangement of a flush-tank placed at the head of each lateral six-inch pipe when it discharges, cleanses the pipe of all deposit if there should be any, thereby preventing any decomposition in the sewer.

[1] The following brief description of the new sewerage system is furnished by its originator, Col. George E. Waring, jun., of Newport, R.I., to whom those are referred who desire further details: —

The unit of the system is a sewer of vitrified pipe six inches in diameter, with tight joints laid in the street (or in the alley between two streets where said alley exists), having at its upper end a "Rogers's field flush-tank," with a discharging capacity of one hundred and twelve gallons. All the houses on both sides of the sewer are connected with it by four-inch pipes of the same material. The house-connection drains enter the sewer at an acute angle, and by a funnel-shaped branch-piece, which delivers the house-waste at the bottom of the sewer, and which ventilates it to its top. The house-connection drain has no top, and it is continued by an untrapped soil-pipe, four inches in diameter, which continues above the roof of the house. Therefore every house-connection furnishes free ventilation to the sewer. The water-closets, sinks, and other vessels in the house are separated from the soil-pipe and drain, each by its own trap.

The flush-tank is fed by a constant small stream from the water-works, only sufficient to fill it about once in twenty-four hours. When full, the continuance of the same small stream causes its automatic siphon to come into action, and the entire contents of the tank are discharged directly into the head of the sewer in from thirty-five to forty seconds. This rapid discharge of such a volume flushes the sewer completely.

At the lower end of the sewer — near its junction with the river — there is a fresh-air inlet, to supply the upward draught through the soil-pipes of the houses.

The six-inch sewer, after receiving not to exceed three hundred house-drains, discharges into a main, or sub-main sewer of eight inches diameter (or more), and the sub-mains discharge into the larger mains. The sizes of the sub-mains and mains are of eight-inch, ten-inch, twelve-inch, fifteen-inch, and twenty-inch diameter. The greatest flow of the twenty-inch main sewer — about three thousand houses being connected — is about nine inches deep.

Porous subsoil tile drains are laid in the same trench with the sewer, to underdrain the ground; and these discharge directly into Bayou Gayoso.

Nothing but house-sewage proper is admitted into these pipes, storm-water being provided for on the surface, and all dry garbage carted away by the public garbage service. Collateral with these sewers are the subsoil drainage-pipes, which have contributed greatly towards drying the ground. These pipes empty directly into Bayou Gayoso. It may not be improper in this connection to state that many objections were urged against this system of sewerage, chief among which was the small size of the pipes, they being only four, six, eight, ten, twelve, fifteen, and twenty inches diameter; its novelty being an innovation on all recognized systems both in this country and Europe, it never before having been tried on a scale which was thought large enough to be a fair test of its practical utility to entitle it to a trial on so large a scale as the one in question. In other words, it was too much of an experiment for a people who had experimented to their serious loss with wooden-block pavements. Objections of this character were urged: —

The small size of the pipes, as compared with other sewers; what seemed to the average citizen a complicated network, a want of apparent durability, with expressions of general distrust in any system. These objections were from the non-professional, — the average taxpayer. But the principle itself was objected to by professional engineers, whose opinions were based on observations in other cities, experience, and theoretical knowledge. These discussions, and a want of harmonious expression and concert of action, had its influence, and much valuable time was lost in agreeing to any fixed plan. Since the commencement of work on these present sewers in January last, there have been completed, and are in successful operation, twenty-six miles of sewers, and thirty miles of subsoil drainage-pipes, one hundred and forty-five flush-tanks, each with a capacity of one hundred and twelve gallons of water, and which discharge into the upper ends of the six-inch laterals once in twenty-four hours. Every occupied house along the line of a sewer is required by ordinance to have proper connections, which embrace water-closets, slop-sinks, bath-tubs, etc.[1]

[1] HOUSE-CONNECTIONS ORDINANCE.

SECTION 1. Be it ordained by the Legislative Council, That it shall be a misdemeanor to do or cause to be done, any of the following acts, as herein provided; and any and all persons guilty thereof shall be fined not less than one dollar nor more than fifty dollars.

SUB-SECT. 1. To uncover the public sewer for any purpose, or make connections therewith, or uncover the public connection-branches thereof, unless and except by the consent, and under the supervision, of the district engineer or his duly authorized agent or agents, whose duty it shall be to insure full compliance with this ordinance in relation to connections; and a failure of duty in this respect shall subject such engineer or agents to all the penalties in this ordinance.

SUB-SECT. 2. To make, or cause to be made, any such connections, except as above provided, and by a competent and skilful mechanic, duly licensed to do such work by the Legislative Council, such mechanic not to be the agent of the district engineer. . . .

SUB-SECT. 3. For the owner or occupant of any building, any portion of which is used for any purpose during any portion of the day, to fail to have at least one water-closet connected with the public sewer fifteen days after notification from the engineer or president of

There has been completed twenty-three hundred and sixty such connections. Under the old city government there were laid two and three-quarter miles of wooden-block Nicolson pavement and five miles of stone pavement. Four and a half miles of sewers, which have about three hundred house-connections, were constructed by individuals or private corporations.

These sewers do not enter into the general plan of sewerage, with which they have no connection, though they have been purchased by the city; and the same ordinance applies to them as to the new. They discharge by separate outlets into the Mississippi River opposite the city.

Since February, 1879, the organization of the present government, there has been completed seven miles of new stone pavement, and six miles of wooden pavement taken up and thrown into the river, leaving four and three-quarter miles yet to be disposed of, which will be done as early as practicable.

There has been destroyed a hundred and eighty-nine houses, which were condemned by the Board of Health as being unsuited for either residence or business purposes and prejudicial to the public health, and as many repaired and put in proper sanitary condition. These houses were first inspected by the Board of Health, and afterwards by a committee from the Legislative Council, which ordered their destruction or renovation as circumstances justified. The work was done by the individual owners, and no compensation allowed.

the fire and police commissioners, and to fail to have such water-closet suitably arranged for use as a urinal, unless a separate urinal is provided.

SUB-SECT. 4. For the owner or occupant of any building in which food is cooked, or clothing is washed, to fail to have a suitable sink, slop-stone, or hopper for the reception of waste water; *provided*, however, that, if the water-closet is of a kind suited to such use, it may receive the waste water, and the sink, slop-stone, or hopper may be dispensed with.

SUB-SECT. 5. To throw, or allow to be thrown or deposited, on the surface of the ground in the taxing district, whether public or private, except in the proper and necessary manuring of the soil, any water which has been used for domestic purposes, or any liquid or solid fœces, or urine.

SUB-SECT. 6. To allow any surface-water or rain-water from the ground or roofs of houses to enter any sewer or drain, or any vessel or slop-stone connected with any sewer or drain, or to admit any drainage-water from any cellar to a sewer; *provided*, however, that drainage may be provided in accordance with the regulations, plans, and descriptions in the district engineer's office, and subject also to the restrictions of sub-section 1 of this ordinance.

SUB-SECT. 7. To use, or caused to be used, any house-drains for any other purpose or purposes than those specified in this ordinance, except by special permission from the Legislative Council.

SUB-SECT. 8. To throw or deposit, or cause or permit to be thrown or deposited, in any vessel or receptacle connected with a public sewer, any garbage, hair, ashes, fruit, or vegetables, peelings or refuse, rags, cotton, cinders, or any other matter or thing whatsoever, except fœces, urine, the necessary closet-paper, and liquid house-slops.

And it is hereby made the duty of all citizens to aid the police in bringing offenders against this ordinance to punishment, and also to prevent breaches of the same.

Passed March 4, 1880.

D. T. PORTER, *Chairman Legislative Council.*

Attest: C. L. PULLEN, *Secretary.*

The following is approximately the elevation of the city above high and low water mark: [1] —

Concord and Second Streets, four feet above high-water, and thirty-seven feet above low-water mark.

Calhoun and Shelby Streets, seventy feet above high-water, and a hundred and three above low-water mark; along bed of bayou, two to thirty feet above high-water, and thirty-five to sixty-five feet above low-water mark.

Average rise of river from low to high water mark, thirty-three feet; extreme rise, thirty-six feet; fall of ground from Front Street to Bayou Gayoso, on Madison Street, forty feet; fall of ground from Front to Concord Streets, twenty feet; fall of ground from Dunlap Street, the eastern boundary, to bayou on Madison Street, forty-eight feet.

Length of bayous in corporate limits, about five miles.

The water-supply of the city is obtained from cisterns, and from Wolf River through the Holly system of water-works. The latter is used for drinking purposes to a very limited extent, though, when properly filtered, it is not objectionable for this purpose.

QUARANTINE.

Memphis can better afford to give up the commerce of the whole country south of it for three or four months of the year, for an indefinite period, than be again subjected to a visitation of yellow fever. The experience of 1879 furnishes the first example in this country of a city of its size being depopulated as far as practicable; having its population reduced from nearly forty thousand to about fourteen thousand, more than two-thirds of which were blacks; of having every avenue of its commerce cut off, and every manufacturing interest suspended; of being surrounded by a line of pickets to prevent either ingress or egress only so far as was thought absolutely necessary; to be quarantined against by the whole country outside of it for more than three months, and having its citizens regarded with distrust and suspicion wherever they went; and to lose, in material wealth and reputation, what it will take years to regain. Even after the epidemic was over, many who formerly purchased goods there were afraid to resume their former commercial relations with her merchants for fear of conveying to their homes the dreaded infection. But this is not all. The depreciation of her real estate was such that it seemed for a time no one would touch it at any price. In the light of its terrible experiences both in reputation and material wealth, as a community it can afford to take no risks; and, when there is doubt as to existing danger, any action had better be in favor of what might be decided as the safest course, though this may result in temporary non-intercourse.

The commercial advantages arising to Memphis from an infected place bears no comparison to the disadvantages incident to the danger of infection from such place. The prevention of a recurrence of epidemic disease of any character, and the maintenance of the best possible sanitary condition,

[1] From engineer's office memoranda, furnished by Assistant City Engineer A. J. Murray.

are with the authorities of Memphis their first duty. Not only further progress and development of the city depends upon it, but a preservation of its present advantages and the prevention of a rapid retrogression. No people have a stronger cause than those of Memphis to properly appreciate the inconveniences of inspection impediments and quarantine restrictions.

The irreparable losses of 1878 and 1879 are too fresh with them to incur any risks when they have well-grounded reasons to apprehend danger. I assume that every epidemic of yellow fever which has occurred in Memphis has been the outgrowth of importation from the South, and, as far as I know to the contrary, from New Orleans, with, perhaps, the single exception of 1879, which I have been unable to trace to an outside source, though, in my opinion, that was a recrudescence from the old importation of 1878, which was traceable to New Orleans. (See paper in vol. v. of Public Health Reports, and papers on the Yellow-Fever Epidemic in Memphis, 1879.)

The theory of the ætiology of yellow fever in New Orleans is a subject on which it seems the profession there is divided. (For an interesting account of the history of yellow fever in New Orleans, see "Tableau of the Epidemic of 1853, with Topographical, Chronological, and Historical Sketches of the Epidemics of New Orleans since their Origin in 1796, illustrative of the Quarantine Question," by Bennet Dowler, M.D.)

From 1817 to 1878, — a period of sixty-one years, — with the exception of four years, as shown by official records, the disease has prevailed there to a greater or less extent. (See "New Orleans Medical and Surgical Journal" for March, 1879, p. 699, article by Dr. Joseph Jones.)

It spread, seemingly more influenced by certain meteorological conditions and susceptibility of material than by artificial restrictive measures. Though the disease was originally exotic to the whole Gulf coast, it is now a questionable point whether or not, from repeated importation and frequent recurrence, it has not become so ingrafted as not to be justly classed as one of the endemic diseases of that locality.

That New Orleans is a standing menace to the country along the Mississippi River for several hundred miles north of her, for at least three months of the year, there is no doubt in my mind. It is unfortunate that the question of the indigenous origin of yellow fever in New Orleans cannot be definitely settled. This point is left decidedly obscure in the conclusions of the board of experts authorized by Congress to investigate the yellow-fever epidemic of 1878. See paragraphs 26 and 27, p. 15, of that report.

In discussing the epidemic of 1878, Professor Joseph Jones, who was thorough and exhaustive in his investigations of the origin of that epidemic, likewise leaves this interesting question unsettled. On p. 698, "New Orleans Medical and Surgical Journal" for March, 1879, he uses the following language: "It seems possible . . . that the disease may have been imported, and also of local origin." In the February number of the same journal for

1879, p. 609, appears an extract from "Vital Statistics of New Orleans from 1790 to 1874," by Professor Stanford E. Chaillé, who was a member of the board of experts above alluded to, which is decidedly more positive on this subject. He says, "That New Orleans has the capacity to originate yellow fever just as well as Havana or Rio de Janeiro, is an assertion which I deem indisputable, and which was often made by the deceased Professor Stone, whose ability, as also his experience in this disease, was unequalled in this city."

On p. 614, same journal and number, appears an extract from the official report of Dr. Smith, president of the Board of Health, in regard to the origin of the epidemic of 1867, in which he affirms that "the Board was unable to trace its introduction from without in the first case." To quote still further from this article of Professor Jones, "In 1869 the yellow fever clearly originated in the shipping. In 1870 there were five hundred and eighty-seven deaths from yellow fever; but a direct communication with foreign importation was not established to the entire satisfaction of the profession, unless it should be assumed that the disease had been introduced by the first case. In 1873 it was admitted officially that yellow fever was introduced by the bark "Valparaiso." In 1874 twenty cases of yellow fever occurred; but these were not traced to any foreign origin.

In 1876 the origin of the disease could not be traced to foreign importation. Official records show deaths from the disease in 1877, 1878, 1879, and 1880.

As a matter of fact, the disease appears there every year. Whether it is due to local causes and arises spontaneously, as any endemic disease would, or is from importation, is immaterial to those outside of New Orleans. The specific poison of the disease is the same, and the danger of its transmission to and affecting another community susceptible to its influence is not diminished by its being endemic to or imported into New Orleans. Upon the recrudescence of the disease from a preceding epidemic, the commission of yellow-fever experts above alluded to is decidedly non-committal, and leaves this yet an open question. (See par. 27, p. 15, report.) It does not necessarily follow that an epidemic must exist in a place in order to become dangerous to other communities. An epidemic may occur in Memphis, the result of infection from New Orleans, though the disease may not reach to that extent there.

That the quarantine regulations below the city are notably defective, it seems there is no question. Upon this subject Professor Jones makes the following comment illustrative of the inefficiency of the quarantine regulations up to 1879, the date of his paper, "New Orleans Medical and Surgical Journal" for February, 1879, p. 616: "Quarantine should not only command all the outlets and inlets to New Orleans, but all vessels from infected ports should either be entirely excluded, or else the cargoes should be landed at the quarantine station, and should be thoroughly fumigated, and then transferred to lighters to be transmitted to the city. Upon no consideration should a vessel from an infected port be allowed to come up to the port of New

Orleans. Vessels trading with Southern ports liable to be affected with yellow fever should be constantly under sanitary police.

"A medical officer should accompany the vessel, and superintend the crew in the infected port, and disinfect the vessel in port and upon the voyage, and see that every proper sanitary measure be instituted. An imperfect quarantine such as now exists at the outlets of the Mississippi River has been a sham and a delusion. The question of the foreign and domestic origin of yellow fever should be determined by an absolute quarantine." The inefficiency of the quarantine during the past summer is exemplified in the fact that the bark "Excelsior" was allowed to pass up to the city in July with yellow fever on board; also by the action of the Louisiana State Board of Health, finding it necessary as late as Aug. 19 to enforce additional rules governing the administration of the quarantine.[1]

In view of the above facts and opinions, coupled with the prevailing opinion that on every occasion of yellow-fever outbreak in Memphis, with the exception of 1879, the disease has been traced to infection from New Orleans, which is proven by its own official records to be more or less infected every year; and it is impossible for one at a distance to determine the extent of danger incident to that infection. I submit that it is the duty of the health authorities of Memphis, and also of the State of Tennessee, to adopt such precautions every year as may be thought compatible with the preservation of the public health, with the minimum amount of inconvenience to commerce, but to guard against the danger of a repetition of infectious disease from this or any other source. While it may not be practicable, if indeed necessary, to maintain a quarantine at the present station below Memphis against New Orleans or places south of Memphis, such as Professor Jones, now president of the Louisiana State Board of Health, suggests should be maintained below New Orleans, the Memphis quarantine should be placed in commission every year by at least the 1st of June, and such precautions instituted as may be deemed best. On May 7 last the National Board of Health was petitioned by the Memphis Board to place on duty at New Orleans, and such other ports as might be deemed necessary, an inspector, whose duty it should be to supervise the shipment, by river or rail, of all goods, merchandise, baggage, etc., and to advise by telegram the resident member of the National Board at Memphis whenever such goods were believed to be infected or in any way dangerous to the public health, that he might promptly notify the Memphis Board of the shipment of such goods. This request was promptly complied with, and an efficient inspection service organized and maintained as long as it was deemed necessary. The quarantine station, located eight miles below Memphis, on the foot of President's Island, the property of the city, was turned over to the National Board, under the charge and at the expense of which it was maintained from May 18 until Oct. 1. For detailed account of

[1] See New Orleans Times (newspaper) of Aug. 20, in which appears official proceedings of the Board of Health.

station during that time, including inspections, expense, etc., see official reports made by officer in charge to National Board of Health.[1]

Until the question of the ætiology of yellow fever is settled in New Orleans, which can only be done by an efficient quarantine, it is impossible to determine when a place which has commercial intercourse with New Orleans is safe from infection during a season of the year when the atmospheric conditions are such as to be favorable to the spread of the yellow-fever poison when introduced into that place. Therefore, with the present administration of affairs in Memphis, I think I can foreshadow the future policy to be pursued in dealing with this question. A quarantine of observation, with a strict inspection service, both by river and rail, over freights, passengers, and baggage, will be maintained; and, if it should be deemed best, which is not improbable, there would be, under the circumstances of existing epidemic, an absolute non-intercourse as far as it is practicable to enforce it. This may seem to be very ultra ground; but I think I express the prevailing sentiment of the gov-

[1] In order to facilitate co-operation between the national and local boards in this inspection service, the following order and personal health certificate was issued by the Board, and placed on all steamboats going to Vicksburg and points below, and also furnished steamboat agents at such points, and the inspectors of the National Board at the several stations below Memphis, with the hope that the travelling public would be subjected to the least possible inconvenience. A policeman was assigned to duty at the steamboat landing to examine and take up these certificates, and give the party holding it a card in lieu thereof, showing that he or she had complied with the requirements of the service. The officer returned the certificate to the secretary of the Board, who kept it on file in the health office.

For valuable suggestions and hearty co-operation in this work, as well as in the local sanitation of Memphis, I am indebted to the officers of the National Board stationed at Memphis, and individually to Dr. F. W. Reilly of the River-Inspection Service.

HEALTH ORDER No. 7.

OFFICE BOARD OF HEALTH,
TAXING DISTRICT, SHELBY COUNTY, TENN.,
MEMPHIS, TENN., July 29, 1880.

The better to protect the public health from the importation of yellow fever into this city, which is now entirely free from that disease, as well as from any other suspicious or alarming sickness; and, specifically, to be enabled to exercise supervision (by domiciliary registration) of persons from the lower valley who may come to Memphis by boat during the next few weeks, it is hereby ordered, —

I. That, except as hereinafter provided, no person, whether passenger, officer, deckhand, roustabout, or other employee, shall land at the port of Memphis from any boat arriving from Vicksburg or below, during the existence of this order, for the purpose of remaining in this city after the departure of the boat upon which he or she may have arrived.

II. That the sanitary officer of this Board on duty at the levee shall board all boats immediately upon their arrival, and shall first examine the certificate of inspection issued by the National Board of Health. If this is in proper form, and certifies that the boat is clean, in good sanitary condition, and free from contagion or infection, — such certification being made by an officer of the National Board of Health at the station on President's Island, — then the officers and employees of such boat shall be allowed to land for the discharge of their usual duties in connection with the boat's business. If, however, the boat

ernment and people I have the honor to represent. In saying this, I do not wish to be understood that the Memphis Board of Health does not propose to co-operate with the National and Tennessee State Boards, or that of any sister State, or that I am an advocate or apologist for the arbitrary and apt-to-be-oppressive policy known as "shot-gun" quarantines, or that I do not adequately appreciate the obligation imposed upon a board of health by the legislation which created it to preserve the public health with the minimum amount of inconvenience to a State or community, or the public carriers passing through a State. I apprehend fully that the first duty of a board of health is to protect and preserve the public health; but, in discharging this duty, it is not contemplated to compromise any of those industries which contribute to the material interest of that community, or interfere with legitimate interstate commercial intercourse, only so far as it may be essential to the end in view. Circumstances may arise, and during the prevalence of epidemics or a well-founded apprehension of danger from infectious disease, that, in order

is unprovided with such certificate, she shall be ordered away from the port, and no person and no thing shall be allowed to land or to be landed at any point within the jurisdiction of this Board. Her owner or agent at this port shall be at once notified of the fact; and suit for the violation of this order shall be instituted in the discretion of the Board of Fire and Police Commissioners of the Taxing District.

III. That any passenger or other person from a boat provided with the proper certificate, as above recited, shall be allowed to land from such boat and to enter the city on presenting to the sanitary officer a personal health certificate in the manner and form as follows: to wit, —

PERSONAL HEALTH CERTIFICATE.

[1]

No.....

(Place) .....

(Date).....1880.

I do hereby certify that I have not within the past twenty days been infected with yellow fever, nor in any manner exposed to its contagion or infection; that I have resided during all of said period at.....Street in the above place, and that I desire to proceed by river to Memphis, Tenn., where I propose residing at.....

In witness whereof, I have hereunto set my hand and seal the day and date above written.

[L.S.]

.....

---

[2]

No. .....

The above-named passenger came on board the.....at the time and place specified, in apparent good health; is personally known to the undersigned..... The statements made are believed to be correct. He (she) has also been informed that persons are forbidden to land at Memphis from boats coming from Vicksburg or below without this certificate, indorsed by an officer of the National Board of Health at the inspection station on President's Island.

.....

Clerk Steamer.....

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[3]

No.....

NATIONAL BOARD OF HEALTH, RIVER-INSPECTION SERVICE,
STATION NO. 25, BELOW MEMPHIS,.....1880.

Being now in apparently good health, the boat on which he (she) arrived being in good

to perform this duty, individual interest, or the interest of a corporation regarded as an individual, must suffer; but, when such is the case, the circumstances demanding such sacrifice should be apparent. Extreme measures of restriction, or stamping out, as it is technically termed, involving individual losses, are to be deprecated; and in order to prevent the necessity for such measures, a proper anticipation, from which should result properly enforced preventive measures. The obligation of ascertaining when danger exists, and the best course to pursue in guarding against it without infringing upon the vested rights of individuals or communities, is the problem for a board of health to solve.

It is impossible for a local board to discharge intelligently and satisfactorily either the duties of local sanitation or quarantine restrictions, unless it has the positive support of the government which commissions it, with the moral support and co-operation of the community in which it operates.

MEMPHIS, November, 1880.

sanitary condition, and its contents believed to be free from yellow-fever contagion or infection, the bearer of this certificate is entitled to land at Memphis in accordance with the health regulations of that port.

....., M.D.,
Inspector National Board of Health.

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[4]

No. .....

OFFICE BOARD OF HEALTH,
TAXING DISTRICT OF SHELBY COUNTY, TENN.,
Aug. 1, 1880.

This certificate must be presented to the sanitary officer of this Board on duty at the levee, who will give a receipt for the same, numbered to correspond with the certificate.

Any person attempting to land at the port of Memphis after this date without such certificate is, under ordinance of the taxing district, guilty of a misdemeanor, punishable by fine (and imprisonment until paid). The penalty will be rigidly enforced.

By order of the Board.

R. B. KING, M.D.,
Secretary Board of Health.

The blank spaces on folds 1 and 2 of the above certificate are to be properly filled up before arrival at the inspection station on President's Island, and all persons desiring to land at Memphis must present themselves to the inspector for examination.

IV. That said personal health certificates shall be procured from the office of the secretary of this Board by all boats above described for the use of their passengers and other persons desiring to land and enter the city of Memphis.

V. That captains or masters of tugs, tow-boats, and tows, from Vicksburg or below, are especially requested to co-operate in the enforcement of this order to the extent of discouraging persons on their vessels from stopping in Memphis. The sanitary officer is instructed to exercise particular vigilance with such persons.

VI. That this order shall take effect on and after Aug. 1, 1880.

R. B. KING, M.D.,
Secretary Board of Health.

XVII.

THE SANITARY ASSOCIATION OF LYNN, MASS.

By J. G. PINKHAM, M.D.

Lynn, Mass., Nov. 22, 1880.

Dear Doctor, — In your last letter, you asked me to give you "a brief historical sketch" of the Sanitary Association of Lynn. While I most cheerfully comply with this request, I labor under the embarrassment of having little to say; for our organization is yet in its infancy, — just beginning to make its history. But, if a statement of its plans and methods of work will help in any way the cause of preventive medicine, I should hardly feel justified in withholding it, even though a proper feeling of modesty might seem to dictate that our Association should wait until it has accomplished more before claiming any thing like a public recognition of its services.

The Sanitary Association of Lynn was organized on the 8th of April, 1879, by ten gentlemen, who met for that purpose at the residence of the Hon. Charles F. Coffin.

The movement cannot be said to have been the outcome of any great popular interest in sanitary science, nor to have been rendered necessary by the occurrence in our midst of a destructive epidemic, like that which has recently devastated some portions of the South. It had its origin, on the contrary, with a few zealous individuals, who felt themselves called upon to preach the gospel of hygiene to a community that was bearing the unnecessary burdens of preventable disease and death.

As a field for missionary work of this kind Lynn is doubtless very much like other manufacturing towns of the same size. It has grown up rapidly since the war. Its houses are mostly cheap structures of wood, built too often upon damp or even wet land, with abounding defects as regards drainage, the means of ventilation, etc. Very little attention has been given to underdrainage as a means of rendering the damp sections of the city more healthy. The population, numbering by the last census something over thirty-eight thousand, is a mongrel one, containing many foreigners, and not a few from the rural districts of New England. There is a fair proportion of intelligent, keen-witted people, but a larger one, I fear, of those who may be justly described as ignorant and stupid, especially as regards the laws of healthy living. The general death-rate is not very high in comparison with other cities; but in some portions of the town it is simply enormous. Consumption is very prevalent, and the zymotics, as a class, frequently so. There has been

a degree of popular interest in sanitary matters created of late years by such excellent publications as the annual reports of the Massachusetts State Board of Health (now, unhappily, a thing of the past) ; but only a few of the more thoughtful and enlightened among the people have taken the pains to inform themselves thoroughly on these subjects. With the great mass of the community there exists only a vague sort of conviction that something ought to be done for the prevention of disease, with no definite knowledge either of general principles or methods. The primary idea in starting the Sanitary Association was to change all this, and to help along the great cause of hygiene, public and private, by convincing people, in the first place, that disease is to some extent preventable ; and, in the second place, by teaching them how to prevent it. It is natural for those interested in any particular work to organize. We see this tendency in religion, in politics, in business, — in fact, in every department of human activity. The formation of our society was but an attempt to secure for those interested in sanitary work the increased power and influence which spring from united action. Although this course had long been contemplated by some of us, yet the decisive step was not taken until after the Sanitary Protection Association of Newport, R.I., was established. It is to this Newport Association, and its efficient promoter, Dr. Horatio R. Storer, that the credit must be given of having first put into practical operation on this continent the plan which originated with Professor Fleeming Jenkin of Edinburgh, Scotland, of organizing societies for the sanitary protection of the homes of members. The idea of protection in the sense of securing systematic and skilled inspection of our dwellings was not one originally entertained by us ; but, when once suggested, was adopted, not only for its intrinsic merits, but as furnishing an effectual means of persuading people to join the Association by enabling us to make a direct appeal to their personal interests. We acknowledge, therefore, our indebtedness to the Association at Newport for having given us by its example the stimulus which became the exciting cause of our action, and for having supplied us with a model after which to fashion our structure. As the idea of protection, in the Edinburgh sense, was at the outset a secondary one with us, the word "protection" was omitted from the name. It is not improbable, however, that we may come to consider this omission a mistake, and to adopt the word.

I send you herewith the several publications of our Association ; viz., rules of organization, etc. ; blank form for inspectors' report ; sanitary tracts Nos. 1, 2, and 3 ; annual report of executive council, — from which much of the information which you seek may be obtained.

A few words of comment, however, may not be out of place. The rules of organization will show in a general way our plan and methods of work. The objects of the Association are there stated in what was conceived at the time to be the order of their relative importance. The education of the people must precede any successful attempt to secure the enforcement of sanitary rules. Owing to the general apathy on sanitary subjects, it was not thought probable that any large number of people would become at once sufficiently

interested in the work of the Association to take an active part in it: hence it was deemed best to intrust the general management of affairs to an executive council composed of members selected on account of their known zeal in the cause. This plan has thus far seemed to work well. The annual fee was fixed at five dollars. Of this, three dollars is supposed to be paid to the inspectors for the annual inspection. It might be as well to make the fee two dollars, and allow each member to pay for the inspection of his premises at a fixed rate.

The report of the executive council gives a brief statement of what was done during the first year of the Association's existence.

The sanitary tracts for the most part explain themselves. No. 1 was in great part rewritten from a circular of the State Board of Health. Such circulars reach but a comparatively few households in any one place; and our object in issuing this remodelled reprint was to give the rules therein contained a greater local circulation. The object of No. 2 will be shown as we proceed. No. 3 was written by a lay member of the Association, and was designed to prepare the way for a more vigorous onslaught on the existing privy system, — one of the greatest evils, viewed from a sanitary point of view, with which we have to contend. As the tract itself declares, in effect it is of little use to legislate much in advance of public sentiment in a country like ours, where all power proceeds from the people. Enactments must be sustained by a large minority, at least, of the citizens in order to effect their purpose. We aim to convince householders that the privy in its present form should be abolished before we make a direct effort to introduce the Rochdale, or some other improved system, as a substitute. Other tracts will follow; the Association meanwhile watching for a favorable opportunity to strike decisive blows at this evil.

The most important thing thus far accomplished has been the establishment of an independent Board of Health, for which the Association may safely take the credit. The powers of a board of health, heretofore lodged with the upper branch of the city government, were seldom exercised; and, as a practical fact, every householder in the place was a law unto himself, and maintained as many nuisances in the shape of filthy privies, sink-holes, piggeries, etc., as suited his convenience or inconvenience. Your correspondent, with some other medical men, had been striving in a quiet way for a number of years to effect a change; but while the greater number of our citizens were indifferent, and paid no attention whatever to the arguments advanced, a few actively opposed the movement on the ground of economy. A silver dollar held before the eye was able to hide the sun of sanitary truth. In 1877 the Legislature, at the instance of the State Board of Health, passed an Act providing for the establishment of boards of health in the several cities of the Commonwealth, the same not to become operative in any place until accepted by a vote of the people. Lynn rejected the Act by a vote of three hundred and twelve yeas to seven hundred and thirty-nine nays. Hardly a fifth part of the legal voters in the city took enough interest in the matter to deposit

their ballots, although the voting took place at the time of the annual election for city officers, when they nearly all went to the polls. The result was a surprise; but perhaps it ought not to have been. The obstructionists had opposed the acceptance of the law, seeking to influence the people by working upon their fears of increased expenditure and the consequent increase of taxation. Whatever sentiment in favor of sanitary reform existed, lacked leadership, and was without organization. Medical men were discredited in advance, and their opinions held as of little value on account of a supposed self-interest. How efforts to prevent disease on the part of those who make their living by curing diseases could be held to proceed from selfish motives, it is hard to see; yet this point was actually made by one of the most intelligent of the obstructionists.

In 1879 another Act was passed by the Legislature, one section of which was designed to enable those cities which had rejected the Act of 1877 to reconsider their action, the condition being that a petition calling for the necessary notification should be signed by at least fifty of the legal voters of such city, and presented to its board of mayor and aldermen thirty days prior to the annual election for city officers. It was this Act which the Sanitary Association took advantage of, preparing and obtaining the signatures to the petition; circulating five thousand copies of "Sanitary Tract No. 2, — A Special Appeal to the Citizens of Lynn in Regard to the Establishment of a Board of Health;" soliciting the influence of the local press; stationing men at the polls in all the large wards to call the attention of citizens to the vote which was being taken, etc. The result of this vote was, yeas, 3,018; nays, 204, — a very gratifying contrast to that of 1877. The Board of Health thus established (in one sense the creature of the Sanitary Association) is now in active operation, and is doing a vast amount of good. If our Association had done nothing else than to bring about this result, it would have furnished a sufficient justification for its existence, and might now "die the death of the righteous," with the certainty of having at some future time a complimentary epitaph on its tombstone. But it has no notion of closing its career while such multitudes of sinners remain to be converted from the error of their ways; while the cure of disease, real or supposed, occupies a more prominent place in the public estimation than its prevention, while men waste their energies in futile efforts to extinguish with water the baleful fires which a secret enemy is feeding with naphtha, instead of ferreting out the rascal, and putting a stop, once for all, to his nefarious work.

The Association is very far as yet from having reached its ideal. It hopes to count its members by the hundred; to perfect its plan of house-inspection, perhaps making of it a system of health-insurance, as suggested in the inspectors' report; to enlarge the scope of its benevolent work by furnishing house-inspection, analyses of water, food, etc., to poor people, either gratuitously or for a nominal sum; to issue many more sanitary tracts; to hold public meetings for the discussion of sanitary subjects; in fact, to use all the effective means in its power to rouse up the minds of our people and set them

to thinking, to the end that greater knowledge may be attained, and that which we already possess faithfully applied for the prevention of disease.

We should be glad to exchange publications with every similar organization in the country.

Very truly yours,

J. G. PINKHAM, M.D.,
Seeretary Sanitary Association of Lynn.

DR. JOHN S. BILLINGS, *President American Public Health Association.*

XVIII.

SANITARY PROTECTION IN NEWPORT.

By HORATIO R. STORER, M.D.,
Newport, R.I.

It has been intimated to me that a brief statement of the present condition of so-called sanitary protection in Newport, R.I., would be acceptable to your Association at its New Orleans meeting.

The organization referred to, similar in aims and working plan to that of Edinburgh, was formed in the autumn of 1878, its main purpose being then set forth as follows: —

"The Association, in reality a mutual insurance company for the preservation of private and public health, is not intended as a substitute for municipal inspection, and will not conflict with the public authorities, but will supplement their action.

"The Association will, however, be in a position to bring to the notice of the public authorities any infractions of their regulations, which, in the opinion of the council, may call for the adoption of this course. To this end it will receive and patiently consider complaints of sanitary defects or nuisances, public or private, within the city limits."

With the details of its system, as published by the Association, and since copied by several journals, and referred to in many State and city health reports, and adopted by quite a number of organizations of similar character to its own, your members are already familiar.

During the two years of its existence, almost daily opportunities have afforded themselves to the Association of influencing, directly or indirectly, the extremely conservative public opinion of the city regarding sanitation. These have been availed of. As evidence upon this point, an editorial in the Newport "Daily News" of July 29, 1880, may be cited: —

"No organization in our city," it states, "is doing more for Newport than this. It has aided largely in suppressing dangerous elements in private dwellings and in public places, and has at the same time materially aided in maintaining confidence abroad as to the sanitary condition of the city. When we remember how largely Newport is dependent on her good name for her prosperity, we shall be able to appreciate the importance of a sanitary organization of this character."

The report of the Association for its second year, rendered in July, 1880, by the recording secretary, Lieut.-Commander E. M. Stedman, U.S.N., will interest your members: —

"The inhabitants of Newport, owing to the situation of their city," said Commander Stedman, "have always enjoyed remarkably good health; and the fact that this has been the case, is looked upon by them with pride and satisfaction, and they have been unwilling to open their eyes to the present, or to look forward to the future. It is sufficient that the pure air of heaven has, in the past, brought health and longevity to them; and it is taken, as a matter of course, that such will be the case for all time to come.

"To be sure, the breezes, as they blow fresh from the sea, are pure as of old; but, as they come sweeping through the now thickly populated town, passing through back-yards filled with mire of slops and filth, and over stagnant water and marsh, the receptacles of garbage and sewage, the pure oxygen is soon contaminated with gases which are not health-giving, thongh they may not immediately kill.

"There was a time when wells dug down into the solid rock furnished pure spring-water. By an occasional cleaning of the well, one generation after another could go on using this water without a doubt of its purity. But estates have been divided and sub-divided, other wells have been sunk, and new cess-pits dug, — the latter, perhaps on account of the narrow limits of the place, close to the well of some old homestead.

"Soon the soil becomes impregnated by the liquid filth, and, naturally, the water of the wells in the neighborhood is infected. This has continued until it is the exception where the water of a well is found fit for domestic purposes.

"In some portions of the city, owing to the neglect of the public authorities to remedy existing evils, the air became laden with poison-germs, and so reduced the system of many, that they readily fell victims to any contagious disease which might spring into existence.

"The importance of placing under strict vigilance the inmates of a house where such disease existed, was overlooked; so that the death-rate of Newport, though small as compared with other cities, was large in those cases which might have been prevented.

"Eminent physicians, summer residents of Newport, anxious as well for the reputation of the city, as to adapt the place to the necessities of city patients, alluded in print to the importance of measures being taken to improve its sanitary defects; and complaints were addressed to the city authorities by native physicians and others. But these appeals were unwelcome and unheeded, and, far from what was earnestly desired, resulted in openly expressed ingratitude to the authors of them.

"Although the board of aldermen were empowered by the State to appoint a board of health, which should have all the powers and duties conferred upon the board of aldermen as a board of health, and notwithstanding the wish of the people, and a memorial signed by the physicians of the city, yet they practically refused to exercise their powers, nor would they confer them upon others.

"Thus matters stood in the fall of 1878, when the Sanitary Protection Association was organized for the purpose of mutual insurance, — an organization of citizens acting in self-defence. But by its constitution it has no political interests whatever, but was organized strictly for the preservation of private and public health.

"It is not, as many seem to think, intended as a substitute for municipal inspection, nor will it conflict with the action of the public authorities; but it solely wishes to assist them in their protection of every citizen.

"The new principle of sanitary protection was originally conceived by Professor Fleeming Jenkin, of the University of Edinburgh, in the early part of 1878; and an association was formed in that city, the objects of which form the basis upon which the Newport Association is founded. These are, —

"To provide its members, at moderate cost, with such advice and supervision as shall insure the proper sanitary condition of their own dwellings;

"To enable members to procure practical advice, on moderate terms, as to the best means of remedying defects in houses of the poorer class in which they are interested;

"And to aid in improving the sanitary condition, and consequent good repute, of the city, by following such course as, in the opinion of the council, may seem calculated to promote this object.

"The tardiness which the public shows in availing themselves of the benefits of such an association may be attributed to apathy in some, and in others to ignorance. We are constantly reading of death and disease due to the neglect of the simplest precautions. We are instructed through the columns of the newspapers, and by sanitary tracts and primers, as to what we should do; but, with the best will in the world, we cannot always be thinking about drains, nor can every householder qualify himself for the functions of house-surveyor and medical officer of health: so the practice of the father of a family usually is to let things alone, until, under the alarm of illness in his house, he decides that the drains must be looked into. Advice may be given, and work done, by some local tradesman, who may be ignorant or careless of sanitary requirements; and one cannot feel certain that he has got his money's worth in safety.

"Matters are somewhat mended when a sanitary engineer of repute is consulted, but the bill will be much larger; and so, with many, the fear of the expense induces them to subject themselves and other people to much risk.

"The Association now numbers twenty-six members; and eighteen inspections have been made, the majority of them only when sickness in the family required it; and in all, with but one single exception, very grave defects have been discovered.

"We all know that the result of long experience proves that poison-germs enter from without, chiefly by the agency of sewer-gas and drinking-water. Serious illness may be contracted by breathing air containing an almost infinitesimal quantity of tainted gas. Simple sewer-gas is little worse than a bad smell; but the tainted gas may be so poisonous, that a very little introduced into a bedroom — so little as to be quite imperceptible to the nose — will almost certainly give typhoid fever to a person sleeping there. How important, then, it is that we should not only put our houses in perfect order, but keep them so! and this can only be done by a systematic inspection.

"In some cities an official exists whose duty it is to inspect the execution of all work which pertains to the sanitary arrangement of a house while it is being built; but his duty does not extend to any subsequent inspection.

"The drains and pipes may have been well designed, and the work well executed; but the decay and failure of drains and pipes are especially dangerous, because these are invariably out of sight. The lead and iron pipes are gradually eaten away, until large holes admit sewer-gas behind the panelling, and so into our bedroom; yet no greater warning is given than a slight closeness in the room.

"Drains crack underground as old or new houses settle, and the sewage pours into the basement. Some one of the family, with the sense of smell more acute

than with others, complains of bad odors; but the evil grows so slowly, that we are not forced into action on any one day.

"Cement crumbles away from joints originally well made. Rats eat through putty; and then at the junction, perhaps, of an expensive leaden pipe with a well-laid drain, we have a hole, through which, day and night, sewer-gas pours into the house; and yet the house may be considered remarkably sweet.

"Not unfrequently the passage of the sewage through the drains is wholly interrupted by the mere accumulation of kitchen grease, or rags; then, while the sewer retains the solid filth, the liquid oozes out at every pore, and yet no harm is suspected. Sometimes, even in a hidden pipe, no trap whatever is introduced between the house and the sewer; and no one is at all the wiser until disease breaks out.

"These accidents are samples of ordinary and inevitable decay, even when work has been well designed and well executed, as has been demonstrated time and time again; and in the inspections made by the engineer of this Association every one of the defects enumerated above has been encountered.

"This shows the importance of a systematic inspection. But few people are willing to incur the expense or the professional skill which such an examination requires; but, if each person interested subscribes his annual fee, then he may command the service of a competent engineer, and feel secure in the permanent efficiency of his arrangements.

"The Association has been slow in its growth; but, upon considering the disfavor with which it was received by the people of our city in the early portion of its existence, we have cause for congratulation that it is steadily increasing its good work, and gaining ground in the estimation of the public.

"Communications have been received from all parts of the country, requesting information in regard to the workings of the Association; and in several cities societies springing from our own have been formed, and are now in successful operation.

"Owing to the advantageous arrangement which this Association, as a corporate body, is enabled to make for the examination of water, many members have obtained an analysis; and, of the well-waters examined, only one sample has been good water. Of the city water, two analyses have been made, — one showing the water to be good; and the other, made during a season of continued drought (the water of the pond being low, and the sample unfiltered), resulting not so favorably.

"It is the desire of the Association to have an analysis of the city water made each month, for the space of one year, that the average condition of the water, which so many of us use, may be ascertained.

"The Association, in the exercise of its function of caring for the interests of its members, as also 'to improve the sanitary condition and subsequent good repute of the city,' has sent several communications to the city authorities; and, although as a general thing these memorials have apparently been treated with indifference, yet they have served as food for thought, and so have not been without avail.

"During the past year the public authorities have done much for the sanitary improvement of the city; and the present mayor, in his inaugural, impresses upon the city council the importance of determined and energetic action in all that pertains to the public health. Let us hope that the advance already made may be continued until Newport may justly have the reputation, at home and abroad, of being one of the most healthy cities in the world.

"But do not leave all the work and responsibility to the city authorities. Each one of us is responsible for the sanitary condition of his own premises; and no one has a right to rest in his efforts until he has done all that is possible to secure the continued good health of all within his dwelling.

"At the outset the expenses of the Association required an entrance fee of six and ten dollars. This has been reduced to three dollars for permanent residents of Newport, and five dollars for those who occupy their dwellings during a portion of the year only; 'this difference being based upon the fact that premises continuously occupied are more likely to be kept in good order, and therefore to require less rigid and expensive examination.'

"No one need hesitate, therefore, on account of the expense, to subscribe to the Association. Let each householder obtain a yearly report as to the condition of his premises. If defects are found, it would naturally be his wish to repair them; and, if none exist, he will feel contented in the assurance that there is nothing more he can do to preserve the life and health of his family."

Thus far the annual report. At the present moment (Dec. 1, 1880) the number of members of the Association has increased to forty-one, each of them representing a dwelling-house that, it is supposed, is now in the best possible condition obtainable by skilled experts, — free from all ordinary self-originating sanitary dangers to its inmates, and free from immediate chance of occasioning danger to outside citizens. Could such be true of all the dwelling-houses in any city, the Utopia of sanitarians would be attained. In many instances membership of the Association has been determined by the occurrence of disease in a family; in several of them as yet, however, but very few comparatively, through the suggestion of the attending physician, wise enough to perceive that thereby his own efforts towards a cure would be materially aided, and his reputation as an honest and reliable adviser greatly increased, — results, both of them, that have certainly been marked in regard to those Newport physicians in active practice who have thus acknowledged the necessity and advantage of such an association.

The faults detected under these circumstances by the inspecting engineer have been serious, such, indeed, as to allow no possibility of doubt as to their relation of cause to effect in producing disease.

Soil-pipes, both of iron and clay, were found cracked or pieces broken out at the joints, the defective portions having been concealed by the manner of placing the pipe.

Joints were found having no cement or solder whatever; while frequently they were merely plastered over, leaving spaces whence sewage escaped.

Joints were found so imperfectly closed that the rootlets of trees entered, and by their growth entirely plugged the pipe, with the result of backward flow, and leakage into and through the foundation-wall of the house, with accumulation of sewage under the cellar-floor.

Soil-pipes of clay were found with the joints reversed, so that at every interlocking there was an obstruction.

Soil-pipes were found leaking directly into the well; poisoning its water, though to the taste it seemed excellent.

Soil-pipes of clay where they should have been of iron, in passing through foundation-walls, were found broken by frost, or slight settling of the house.

Soil-pipes were found with old fractures that had been plugged with wood, which in time had rotted away, and allowed sewer-gas to escape.

Joints were frequently found filled with putty or cement instead of lead.

Direct communications, with no intervening tap, were found between house and cesspool; detection being made through inspection alone, there having been no preceptible odor, although such had been the state of things for more than a year.

Cesspools were constantly discovered in close proximity to wells, thus suggesting an examination of the well-water, which by the analyst of the Association has rarely been found good in any portion of the city.

The inspections have revealed defects in sewerage in every case made, save one; and in this instance the furnace was found to take its air-supply from the cellar, thus causing, in the attending physician's opinion, the slow healing of a surgical wound in one of the inmates of the house.

This list of faults actually found in the houses of the members of the Newport Association might be largely increased. Similar instances, however, occur in the daily practice of every sanitary engineer. There is not a city, town, or village, represented by delegates to your own Association, in which they do not exist.

And so with regard to the diseases whose causation has thus far been traced and absolutely proved in Newport, — scarlet fever, typhoid, and the like; and, what is far more frequent from such an origin than is generally supposed, the slow and unsatisfactory healing of wounds, and recovery after surgical operations. Were every physician, when taking charge of a medical case or attending a confinement, and were every surgeon, when called to an accident or when undertaking to perform an operation, only to insist, for his own reputation, if not for the good of his patient, that the house should be thoroughly examined and put into good sanitary order, the annual percentage of deaths would everywhere be wonderfully decreased.

In a public way, also, the Association has already effected much, — all perhaps that, under the circumstances, could reasonably have been hoped. Newport is, in every sense, a place by itself. Its people, — a large part of the native and all-the-year-resident portion at least, — while in many ways admirable, and most interesting to live among, are extremely old-fashioned, conservative, self-centred, and slow to be persuaded, even in matters of their own interest and directly affecting themselves. Each year a certain proportion of the aged die off: their children are more in harmony with progress. Could the summer residents, many of them the representative men of our great centres of civilization, but remain through the winter at Newport for only one single season, take a part in the municipal election in the early spring, and thus help to shape and enforce the ordinances by which the health and lives of themselves and their families are nominally protected, but in reality endangered, during their now temporary stay of but several months each year, there would

result an absolute change for the better in the general condition, the local laws, the public sentiment of the place. A sudden improvement of the kind is doubtless impossible. With each year, however, there is occurring a gradual approximation to the result desired.

Above all else, there is needed a separate board of health, distinct from the aldermen, who now officially act as such, but who, however well meaning they may be as individuals, are yet unfitted for such grave responsibilities by their lack of special training, the multiplicity of their other civic duties, and the fact that they are still chosen by wards, with their rival interests and jealousies, instead of by the city at large. To obtain the appointment of such a separate board has from the outset been the constant endeavor of the Sanitary Association. A year ago, and in great measure through its repeated memorials to the city government, a so-called advisory board was appointed, consisting of three very competent persons, — one of them a civil engineer; and the other two, physicians attached to the Newport Hospital. These gentlemen were, however, not expected by the aldermen to volunteer any advice; and, when requested of them, it was not always followed. During the present year, the city election being publicly charged to have been controlled by money sent from Providence to affect the canvass for State officials (and this has not been contradicted), a re-actionary city council was elected, which has failed as yet to even re-appoint the advisory board, much less to elect a permanent one, although a special Act recommending it to do so had been passed by the State Assembly.

During the same period, the present year, gross derelictions of official duty, or at least instances of excessive timidity and inefficiency, upon the part of the city council, have occurred; and against them the Sanitary Protection Association has faithfully, but this far vainly, protested. A vast piggery, horribly cared for, has been permitted in the neighborhood of the finest quarter of Newport, in the face of a city ordinance by which the keeping of swine was forbidden, and delicate persons have been made ill in consequence and compelled to leave the town. The private contractors for the removal of swill have, even in the hot season, made their calls, or not, as suited their own convenience, although by another city ordinance their duties were clearly defined; while the filthy wagons of privy-cleaners — both wagons and laborers being of the oldest fashioned kind — have been allowed to poison the air, defile the streets, turn the stomachs of all who were not bestial people, and bring down maledictions upon mayor, aldermen, and common council combined. These and such things, sooner or later, cannot fail to be amended. Meanwhile, and very justly, the reputation and the prosperity of Newport are materially injured.

For one, and I am not alone in this matter, despite the attractions of Newport, and its comparatively satisfactory winter climate, I have thus far declined to recommend families containing delicate members to come here for permanent residence. The natural conditions of the place are favorable for health and longevity. A good many of the past generation, exceptionally

hard to kill, and surviving as the fittest, have attained here a green old age; but within a very few years Newport has doubled its population, and consequently its sources of filth. So that until there exists a proper system of sewerage (as yet there is none at all); until the soil-water is reduced at least to its natural level (as yet no provision has been made for the escape, other than through the soil, of an abundant aqueduct supply that is now in domestic use in all portions of the city); until the city has consented to have hydrants for fire and general sanitary purposes (as yet it refuses, though the aqueduct water is running under every street); until many of the old cesspools that now contaminate the wells are filled up or removed; until the real-estate agents are directed by city ordinance to furnish evidence, certified to by a competent inspector, that the houses they offer to strangers are safe to live in, and not mere death-traps like several already examined by the inspecting engineer of the Sanitary Association; and until, over and above all, there is here a permanent board of health officials, who will care for these and other sanitary matters systematically, and not as now at haphazard, — it will be just as well for intending residents to wait a little longer, perhaps a year or two even, before purchasing an estate. The time will eventually arrive when people can, in reality, safely come here to live. To speed that time is at present one of the great objects of the Sanitary Protection Association.

XIX.

ABATTOIRS.

By GUSTAVUS DEVRON, M.D.,
New Orleans, La.

Abattoirs, or slaughter-houses, are classed among the unavoidable nuisances incidental to the congregation of men in cities or towns; and the danger to public health from them usually increases in the same ratio with the population. Sanitary and police regulations, to mitigate the same, must, at an early date, have become necessary.

The first indication of the probable existence of abattoirs is to be found under the emperors of Rome. A corporation or guild of butchers, with their employees, existed there; and it was their duty and exclusive privilege to slaughter the animals for the supply of meat to the inhabitants of that city. The buildings for that purpose were at first located in various parts of the city; but they were eventually confined to one quarter or place, and formed the public meat-market. At the time of Nero this was one of the most imposing structures of the great city.

In Gaul, now France, the same system was introduced by the Romans; and in Paris it was also the privilege of certain families to manage the slaughter-houses. When the city of Paris increased, it became necessary to remove the slaughter-houses from the dwellings; and King Charles IX. issued, 25th February, 1567, a decree relating to the nuisance, and the necessity of its mitigation or abatement.

The continued increase in population and extent of Paris had rendered the numerous slaughter-houses of that city dangerous to the health and comfort of its inhabitants; and Napoleon I., by the decree of 9th February, 1810, authorized the construction of public abattoirs, or slaughter-houses, on the outskirts of Paris, and appointed a commission for the consideration of the subject. As a result of the above decree, and on the report of the commission, five abattoirs were formally opened on the 15th September, 1818:—

	ACRES.
1°. Montmartre abattoir, occupying	$8\frac{3}{4}$
2°. Menilmontaut " "	$10\frac{1}{4}$
3°. Grenelle " "	$7\frac{3}{4}$
4°. Villeguif " "	$5\frac{1}{2}$
5°. Du Roule " "	$5\frac{3}{4}$

The Montmartre and Menilmontaut abattoirs contain each 64 slaughter-

houses; Grenelle, 48; and Du Roule and Villeguif, 32 each. The dimensions of each of above slaughter-houses are 29½ by 13 feet.

The above abattoirs cost $3,468,800, and were not erected for the convenience or in the interest of the butchers; but that great outlay of money, and the subjection of many to inconvenience, was made for the protection of the health and life of the inhabitants of Paris.

The example set by France has been, since 1818, more or less perfectly followed wherever large communities have realized the danger of private slaughter-houses among their dwellings; and yet at this day, though many of the large cities of Europe and America have public abattoirs under sanitary regulations, it is astonishing that so many large cities are yet unprovided with the same, and that their inhabitants "should remain willing to endure the numerous private slaughter yards or sheds, offensive in the highest degree to both the eye and smell, and, what is worse, diffusing pestilence and death through the midst of their population."

In 1848 it became necessary to establish two new abattoirs near Paris for the exclusive slaughtering of hogs; and in 1856, under Napoleon III., four new abattoirs were erected, and, like the older ones, are municipal establishments, and not only contain accommodations for the slaughtering of oxen, calves, sheep, and pigs, but also triperies and shops for the melting of fat. Being classed among manufactures dangerous to health class first, they are managed under decrees of 15th October, 1810, and the Royal Ordinances of 14th January, 1815, and 15th April, 1838.

From Paris the establishing of public abattoirs extended to the provincial cities of France; and at the present date there is no city of importance in that country that is not provided with one or more abattoirs, and even small communes possess the same. From the moment the public abattoirs are opened in any part of France, all private slaughter-houses in the same city or district are closed.

Belgium in 1849 opened public abattoirs similar to those of Paris near Brussels, and many of the smaller cities followed the example.

Switzerland about the same time erected public slaughter-houses in Geneva, Zurich, Basle, and Schaffhausen.

In Great Britain, London, Edinburgh, and a few other cities have erected abattoirs; but these establishments, though built with all conveniences for the necessities of the butchers who slaughter in them, only abate partially the great nuisance of private slaughtering in large cities among the dwellings. The last remarks apply more especially to London abattoirs.

In Austria an imperial decree (1850) orders that abattoirs, or public slaughter-houses, shall be built by all towns or cities out of their municipal funds, and almost all large cities, and even small towns, of that empire have complied with the order. In Vienna two large and magnificent abattoirs have been erected (1851) at the extreme end respectively of the suburbs of St. Mark and Gumpeldorf.

In Germany many of the large cities are provided with public abattoirs, and some have lately substituted new and more extensive ones for the old ones.

Italy has slaughter-houses at Naples and at Milan.

In the United States the public abattoirs, or slaughter-houses, are not as common to our cities as the intelligence and means of their inhabitants should warrant.

This apparent disregard of hygiene and sanitary laws in tolerating among their dwellings private slaughter-houses to pollute the wells, the rivers, the soil, and even the air they must breathe, is due to the fear of trespassing on the rights of others, and of incurring litigation, though the same be done for the preservation of life and of health. If in absolute monarchies it took years to force the people to make some effort to avoid sickness and death, and thus to prolong the average duration of their lives, it is not astonishing that in England with her liberties, and in the United States with their still greater freedom, the fear of sanitary violations of supposed rights have made the introduction of public abattoirs and other sanitary measures so difficult in so many cities where such would be most needed.

New York City, Jersey City, Chicago, Philadelphia, Pittsburg, Cincinnati, and Boston have established public abattoirs. The last — known as the Brighton abattoirs, erected in 1870, and since several years under the direct supervision of the Massachusetts Board of Health — is a model establishment of its kind, an honor to the city of Boston and to the Board of Health.

As early as 1865 the Legislature of the State of Louisiana felt the necessity of establishing an abattoir, or slaughter-house, below the city limits, and to remove at the same time, and to the same vicinity, the stock landing stables, or live-cattle market. At that time, and for years previous, all the private slaughter-houses were situated in Bouligny and Jefferson City, and some even as low as the Fourth District of New Orleans, adjoining the two above-named suburbs of this last city, and surrounded the live-stock landing stables. These private slaughter houses or sheds emptied their washings and the blood of slaughtered animals in the street-gutters, which, in their vicinity, were mere ditches on the sides of dirt or unpaved streets. Little, if any, of this rapidly decomposing liquid reached the drainage canals in the rear of the city. Most of it was absorbed by the soil, or evaporated by the sun, and made part of the atmosphere of that portion of the city and its vicinity, giving it an odor, *sui generis*, never to be forgotten when once inhaled.

The old stock landing stables were even a greater nuisance than the private slaughter-sheds surrounding them, on account of the noise and odor due to the accumulation of a large number of cattle of all sorts in sheds or stables covering several squares.

The floors of such of the above stables as were provided with any, were made of flat-boat lumber, which we all know, in this city, from other and better lumber by its numerous holes of one inch or more in diameter.

These openings allowed the soil under the stables to be saturated with the urine and other excreta of all the animals.

Furthermore, in the stock-stables a number of diseased animals died, and were thrown in the Mississippi River in front of said stables, situated above

the upper limits of the city; and it was a daily occurrence to see a number of dead animals in all stages of decomposition brought by the eddies of the river over the end of the suction-pipe of the Water-Works Company, which furnishes the drinking-water of three-fourths of the citizens of New Orleans.

The carcasses, which did not stop at that favorite spot, drifted down the river, and lodged under the wharves of the city, to the annoyance of the whole shipping, and of the residents on the river-front.

These facts were brought before a committee of the Legislature in 1865, and relief was asked, but to no purpose; for the pressure of interested parties, and the fear of displeasing a numerous and influential class of citizens who were engaged in the live-stock and slaughtering business, prevented the enactment of the great Sanitary Act creating the abattoirs, until March 8, 1869, when the following Act was promulgated. (See Appendix.)

The Crescent City Stock Landing and Slaughter-House Company, incorporated in 1869, established their wharves and buildings on the right side of the Mississippi River, below the New Orleans and Texas Railroad depot.

The litigation which followed the efforts of the company to put into effect their charter is, in this city of public notoriety, passing through all the lower courts, thence to the Supreme Court of the State, and finally to the United States Supreme Court. It was only in 1872 that the constitutionality of the Act was determined. This did not, however, end the litigation; for certain butchers, who were interested in preventing the sanitary provisions contained in this charter, through their attorneys, fought every provision of the Act until there was nothing left as an excuse for litigation.

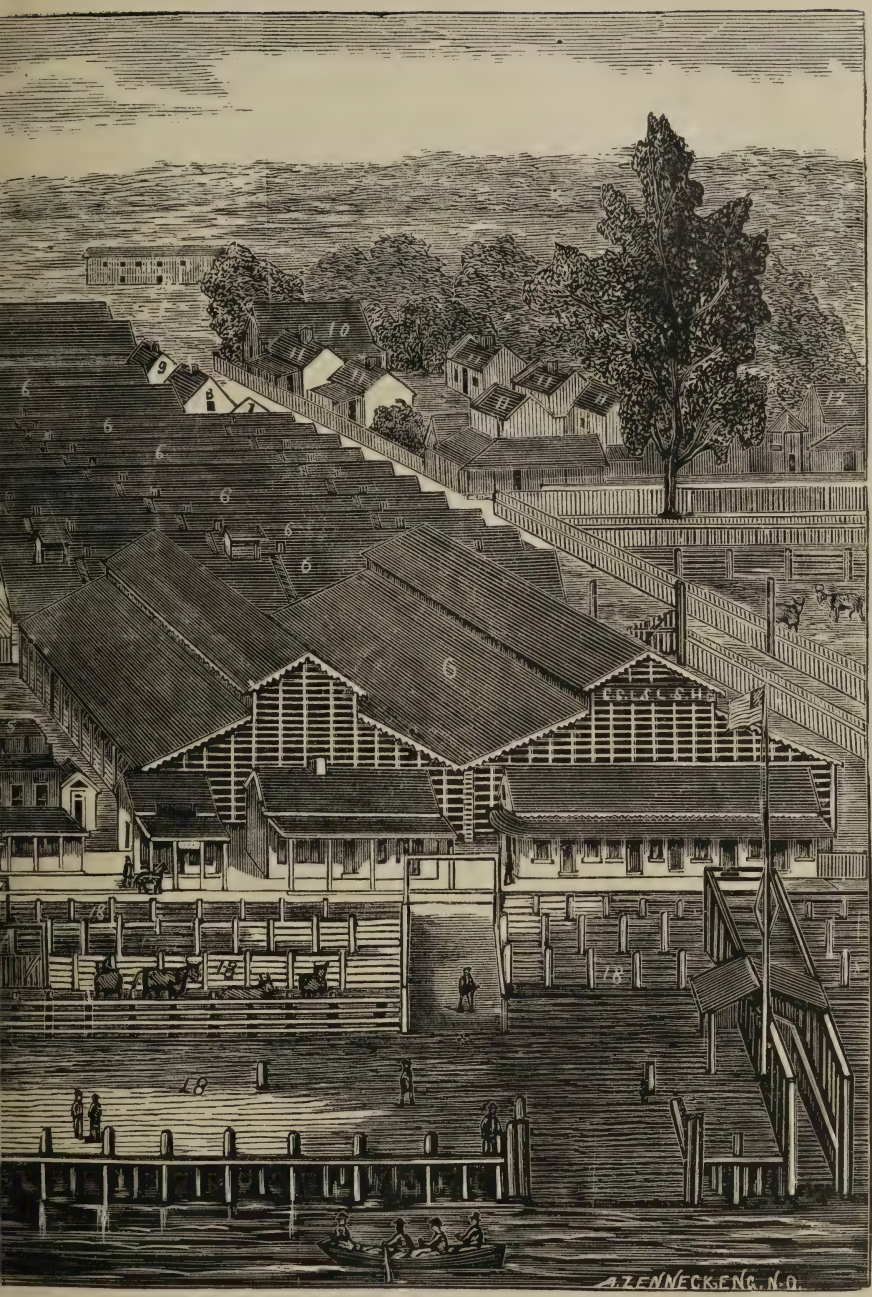
Pending these numerous and expensive suits, for the better accommodation and greater convenience of the butchers, and also the better to promote and carry out the object of the Slaughter-House Act, the main abattoirs were transferred to the left bank of the river, about two miles lower than the former site; leaving at the same time a smaller slaughter-house on the right, to supply the wants of the butchers of Algiers.

The grounds on which the main abattoirs and stockyards of the Crescent City Live-Stock Landing and Slaughter-House Company are situated, have a front of nearly 1,000 feet on the river, and a superficial area of about 320 acres. The costs of this land, buildings, and machinery necessary for the abattoirs, have cost the company over $300,000. The first abattoir on the opposite side of the river had cost nearly as much.

The New Orleans abattoirs have on the river-front capacious wharves of proper construction for the reception of cattle from steamboats, which deliver them at once into cattle-pens adjoining the wharves, from which they can be driven into the pastures in the rear of the building, or into the sale-stables in the building.

The buildings are of wood, and elevated on brick foundations to secure free ventilation under the floors, which are of strong cypress, two and one-half inch lumber, and made water-tight by the constant use of water on them. The sides of the building, so far as can be soiled by blood or other substances, both

ABATTOIRS AND STOCKYARDS OF THE CRESCENT CITY



-STOCK LANDING AND SLAUGHTER-HOUSE COMPANY.

inside and outside, are coated with black varnish, which prevents the wood from absorbing any blood or other offensive matter, and allows the sides to be washed as readily as if glazed.

The front building contains 12 floored sale-pens, with a capacity for 25 oxen each, or 300 in all; also 12 other dirt-bottom feeding-pens of same capacity as the floored ones, and which are used for provisional keeping of stock until transferred elsewhere.

In the main buildings are 27 sale-pens (main pens), each of 25 oxen capacity, in all 675 oxen; 8 dirt-bottom feeding-pens of 20 capacity, 160 oxen; 47 hog-pens for 60 hogs each, or a total of 1,020; 23 pens in rear and adjoining slaughtering-rooms, each for 30 oxen, or total of 690; hog-pens to contain 500 hogs; sheep-pens of a capacity for 2,000 sheep, one large slaughtering-room, 32 by 80 feet, and with facilities to kill and prepare 300 sheep a day; one large hog-slaughtering room, also 32 by 80 feet, with large hot-water tank, and a capacity for killing and preparing 300 hogs daily. This same building also contains 19 slaughter houses or rooms, 22 by 32 feet, with a capacity for slaughtering and cooling of 25 oxen each, or a total of 475; and 4 slaughter-houses, 28 by 32 feet, with capacity for 50 calves, or a total of 200 daily.

A short distance from the slaughter-houses are mule-stables for the use of butchers. Each stable is 17 by 22 feet, and contains 3 stalls; and in the same building are to be found 32 salting-vats. Two engine-houses, — one in front, near wharf, with one boiler and two pumps for water, of a capacity of 200,000 gallons of water daily; the one in the rear, with two large boilers and one doctor engine to furnish steam and hot water for scalding hogs, and also to furnish the motive power of the manufactory of tallow and blood-fertilizers.

The water-pumps of the abattoirs supply an unlimited quantity of water to all parts of the buildings, both for cleaning floors and walls, in sufficient volume to carry away all *débris*, scrapings, and washings into the river, where a favorable and rapid current carries the same to the middle of the stream. These pumps are also useful for the extinguishing of fires in any part of the buildings, which are also protected by a steam fire-engine and a company of volunteer firemen, nearly all officers or employees of the establishment, or residents of the immediate vicinity.

In the rear of the main abattoir building is situated a tallow factory and a blood-fertilizing establishment belonging to a separate company, which utilizes all the blood, droppings, and refuse of the slaughtering-rooms, and collects them as rapidly as they are produced. This company, like the Abattoirs Company, and the tannery and tripery also on the grounds, are all under the surveillance of the Board of Health of the State of Louisiana.

The officers of the Slaughter-House Company have always been anxious to obey all sanitary rules of the Board, and to introduce every improvement suggested to ameliorate the abattoirs.

The Act creating the Slaughter-House Company gives the appointing of the inspector of cattle and meat to the governor. That appointment should have

been given to the Board of Health, who are responsible for the execution of all sanitary laws, and the Act should be so amended.

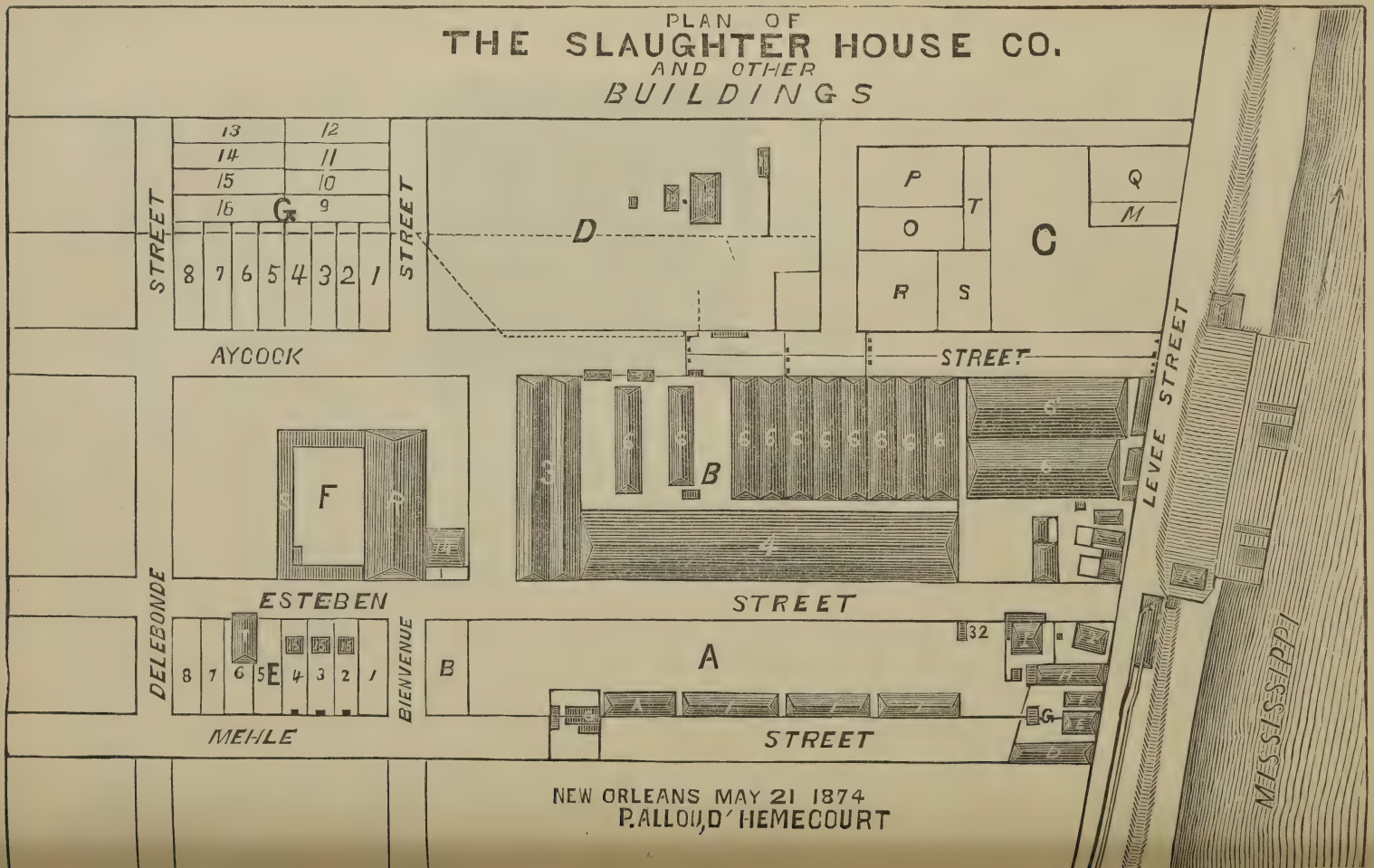
The annexed table for the two and a half years ending July 1, 1880, shows the importance of the establishment, and proves that the average slaughtering has never reached its capacity: —

TABLE SHOWING NUMBER OF CATTLE WHICH PASSED INSPECTION AND WERE SLAUGHTERED BY THE CRESCENT CITY SLAUGHTER-HOUSE COMPANY, FROM JAN. 1, 1878, TO JULY 1, 1880, A PERIOD OF 2½ YEARS.

MONTHS.	BEEVES.	CALVES.	SHEEP.	HOGS.
1878.				
January	3,461	3,976	1,737	2,405
February	3,145	3,269	1,603	1,708
March	3,212	2,983	1,967	1,726
April	3,023	3,639	2,105	1,425
May	2,400	4,335	2,316	1,370
June	3,398	4,411	2,010	1,102
July	3,662	4,668	1,835	940
August	3,446	4,465	1,618	894
September	3,722	4,181	1,418	1,095
October	3,976	3,887	1,683	1,440
November	3,712	4,025	1,792	2,666
December	3,721	3,270	1,825	2,781
1879.				
January	3,493	3,270	1,552	2,516
February	3,096	3,022	1,675	2,001
March	2,954	3,172	1,699	2,073
April	2,791	3,190	1,825	1,732
May	3,258	4,525	1,947	1,415
June	3,219	3,976	1,686	977
July	3,377	4,347	1,608	919
August	3,375	4,823	1,460	1,180
September	3,386	4,813	1,569	1,281
October	3,848	4,721	1,809	1,646
November	3,468	4,066	1,743	1,985
December	3,594	3,966	1,868	2,318
1880.				
January	3,678	4,060	2,121	2,231
February	2,934	3,184	1,722	2,008
March	3,121	3,443	1,932	2,025
April	3,059	3,667	1,799	1,586
May	3,263	4,372	1,968	1,445
June	3,466	4,917	2,006	1,064
	100,258	118,653	53,898	49,954

The average daily slaughter during the last month has been 122 oxen against a capacity of 475; calves, 132, with facilities for 200; sheep, 60, when 300 could be slaughtered; hogs, 55, with a capacity of 300 a day.

The grounds of the former Delery Plantation, on which the abattoirs are situated, have been transformed into a little village, whose inhabitants are more or less connected with the establishment either as employers, laborers, or tradesmen; and in this village are to be found several stores and other establishments, where every thing needed can be obtained at once by the residents or visitors.


PLAN OF
THE SLAUGHTER HOUSE CO.
AND OTHER
BUILDINGS
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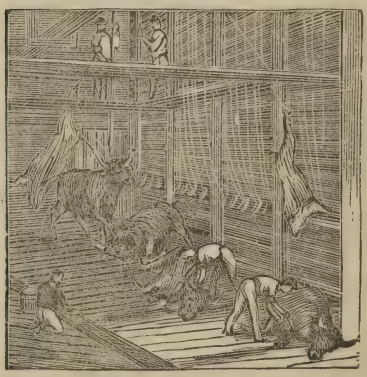
MISSISSIPPI
NEW ORLEANS MAY 21 1874
P. ALLOU, D' HEMECOURT

Nearly three hundred men and women find constant employment at the abattoirs and stock landing stables as laborers for the butchers and employees of the company; and this number does not include the master-butchers, nor the drivers of the meat-carts.

As an evidence of the high value placed on this slaughter-house as a sanitary measure, I will state, that, in the published testimony given in favor of the location of the Philadelphia stockyard and abattoir, are found sworn statements from Dr. C. B. White, then president of the Louisiana State Board of Health, and from Dr. A. W. Smyth, then the house surgeon of the Charity Hospital and member of the Board of Health, in the following words: —

"That the deponent is acquainted with the Crescent City Live-Stock Landing and Slaughter-House Company situated on North Peters Street, and that all the fresh meats consumed and used by the citizens of New Orleans are obtained at the abattoirs of said company. The abattoir system has proved a great improvement over the method formerly practised of killing animals in numerous and separate locations of said city, and in comfort to the community the improvement is universally admitted.



"No complaints, to the knowledge of deponent, have been made by the residents adjoining said slaughter-house of any unpleasant or unwholesome odors from the slaughtering of animals therein; and no increase of disease in the vicinity thereof has been observed or reported."

The above was sworn and subscribed by the above well-known physicians and sanitarians before Alfred Ingraham, Commissioner of Deeds for the State of Pennsylvania.

As a resident of the third district, and formerly the sanitary inspector of the same, the works of the above abattoirs have been under my constant observation; and it is with pleasure that on this day I use to conclude this paper the words of my special report to the Board of Health, December 31, 1875: —

"I most fully indorse all the statements made above, and give full credit to the officers of the company for their zealous and successful efforts to comply in every particular with the charter granted them by the State of Louisiana, to assist in protecting the health and life of the inhabitants of the city of New Orleans.

"Gustavus Devron, M.D."

APPENDIX.

AN ACT TO PROTECT THE HEALTH OF THE CITY OF NEW ORLEANS, TO LOCATE THE STOCK LANDINGS AND SLAUGHTER-HOUSES, AND TO INCORPORATE THE "CRESCENT CITY LIVE-STOCK LANDING AND SLAUGHTER-HOUSE COMPANY."

SECTION 1. *Be it enacted by the Senate and House of Representatives of the State of Louisiana in General Assembly convened*, That from and after the first day of June, A.D. (1869) eighteen hundred and sixty-nine, it shall not be lawful to land, keep, or slaughter any cattle, beeves, calves, sheep, swine, or any other animal, or to keep or establish any stock landing, yards, pens, slaughter-houses, or abattoirs, at any point or place within the city of New Orleans, or the parishes of Orleans, Jefferson, and St. Bernard, or at any point or place on the east bank of the Mississippi River within the corporate limits of the city of New Orleans, or at any point on the west bank of the Mississippi River above the present depot of the New Orleans, Opelousas, and Great Western Railroad Company, except that the "Crescent City Live-Stock Landing and Slaughter-House Company" may establish themselves at any point or place as hereinafter provided. Any person or persons, or corporation or company, carrying on any business or doing any act in contravention of this Act, or landing, slaughtering, or keeping any animal or animals in violation of this Act, shall be liable to a fine of two hundred and fifty dollars ($250) for each and every violation, the same to be recoverable with costs of suit before any court of competent jurisdiction.

SECT. 2. *Be it further enacted, etc.*, That William D. Sanger, Joseph H. Pearson, J. R. Irwin, John Wharton, Franklin J. Pratt, R. T. Packwood, N. W. Travis, Henry V. Barringer, L. P. Sanger, W. S. Mudgett, Oliver D. Russell, J. Viosca, S. P. Griffin, L. H. Crippin, William McKenna, A. J. Oliver, F. G. Clark, and their successors, be, and are hereby, created a body politic and corporate, to be known and designated as the "Crescent City Live-Stock Landing and Slaughter-House Company," and by that name and style shall sue and be sued, purchase, hold, sell, contract, lease and release, grant and transfer, and may do all things necessary for the purposes hereinafter mentioned, and perform all other acts, and exercise and enjoy all other rights and privileges, incident to corporations; adopt and use a common seal, make, publish, and alter at pleasure by-laws, rules, and regulations, for the government of the company or corporation, and the carrying-on of its business; shall determine and appoint their officers, and fix their compensation and term of office, and shall fix the amount of the capital stock of the said company or corporation, and the number of shares thereof.

The domicile of the company or corporation shall be in the city of New Orleans, and the president shall be the proper officer on whom to serve citations, notices, and other legal process, wherein this company or corporation may be interested.

SECT. 3. *Be it further enacted, etc.*, That the said company or corporation is hereby authorized to establish and erect at its own expense, at any point or place on the east bank of the Mississippi River within the parish of St. Bernard, or in the corporate limits of the city of New Orleans below the United States barracks, or at any point or place on the west bank of the Mississippi River below the present depot of the New Orleans, Opelousas, and Great Western Railroad Company, wharves, stables, sheds, yards, and buildings necessary to land, stable, shelter, protect, and preserve all kinds of horses, mules, cattle, and other animals, from and after the time such buildings, yards, etc., are ready and complete for business, and notice thereof is given in the official journal of the State; and the said Crescent City Live-Stock Landing and Slaughter-House Company shall have the sole and exclusive privilege of conducting and carrying on the live-stock landing and slaughter-house business within the limits and privileges granted by the provisions of this Act; and cattle and other animals destined for sale or slaughter in the city of New Orleans or its environs shall be landed at the live-stock landing and yards of said company, and shall be yarded, sheltered, and protected, if necessary, by said company or corporation; and said company or corporation shall be entitled to have and receive for each steamship landing at the wharves of the said company or corporation ten ($10) dollars; for each steamboat or other water-craft, five ($5) dollars; and for each horse, mule, bull, ox, or cow landed at their wharves, for each and every day kept, ten (10 c.) cents; for each and every hog, calf, sheep, or goat, for each and every day kept, five (5 c.) cents, all without including feed; and the said company or corporation shall be entitled to keep and detain each and all of said animals until said charges are fully paid. But if the charges of landing, keeping, and feeding any of the aforesaid animals shall not be paid by the owners thereof after fifteen days of their being landed, and placed in the custody of the said company or corporation, then the said company or corporation, in order to reimburse themselves for charges and expenses incurred, shall have power, by resorting to judicial proceedings, to advertise said animals for sale by auction, in any two newspapers published in the city of New Orleans, for five days; and, after the expiration of said five days, the said company or corporation may proceed to sell by auction, as advertised, the said animals, and the proceeds of such sales shall be taken by the said company or corporation and applied to the payment of the charges and expenses aforesaid, and other additional costs; and the balance, if any, remaining from such sales, shall be held to the credit of and paid to the order or receipt of the owner of said animals. Any person or persons, firm or corporation, violating any of the provisions of this Act, or interfering with the privileges herein granted, or landing, yarding, or keeping any animals in violation of the provisions of

this Act, or to the injury of said company or corporation, shall be liable to a fine or penalty of two hundred and fifty ($250) dollars, to be recovered with costs of suit before any court of competent jurisdiction.

The company shall, before the first of June (1869), eighteen hundred and sixty-nine, build and complete a grand slaughter-house of sufficient capacity to accommodate all butchers, and in which to slaughter five hundred animals per day; also, that a sufficient number of sheds and stables shall be erected, before the date aforementioned, to accommodate all the stock received at this port, all of which to be accomplished before the date fixed for the removal of the stock landing, as provided in the first section of this Act, under penalty of a forfeiture of their charter.

SECT. 4. *Be it further enacted, etc.*, That the said company or corporation is hereby authorized to erect, at its own expense, one or more landing-places for live-stock, as aforesaid, at any points or places consistent with the provisions of this Act, and to have and enjoy from the completion thereof, and after the first day of June, A.D. (1869) eighteen hundred and sixty-nine, the exclusive privilege of having landed at their wharves or landing-places all animals intended for sale or slaughter in the parishes of Orleans and Jefferson; and are hereby also authorized, in connection, to erect at its own expense one or more slaughter-houses at any points or places consistent with the provisions of this Act, and to have and enjoy from the completion thereof, and after the first day of June, A.D. (1869) eighteen hundred and sixty-nine, the exclusive privilege of having slaughtered therein all animals, the meat of which is destined for sale in the parishes of Orleans and Jefferson.

SECT. 5. *Be it further enacted, etc.*, That whenever said slaughter-houses and accessary buildings shall be completed and thrown open for the use of the public, said company or corporation shall immediately give public notice for thirty days in the official journal of the State, and within said thirty days' notice, and within, from, and after the first day of June, A.D. (1869) eighteen hundred and sixty-nine, all other stock landings and slaughter-houses within the parishes of Orleans, Jefferson, and St. Bernard, shall be closed; and it will no longer be lawful to slaughter cattle, hogs, calves, sheep, or goats, the meat of which is determined for sale within the parishes aforesaid, under a penalty of one hundred ($100) dollars for each and every offence, recoverable, with costs of suit, before any court of competent jurisdiction. That all animals to be slaughtered, the meat whereof is determined for sale in the parishes of Orleans or Jefferson, must be slaughtered in the slaughter-house erected by the said company or corporation; and upon a refusal of said company or corporation to allow any animal or animals to be slaughtered after the same has been certified by the inspector, as hereinafter provided, to be fit for human food, the said company or corporation shall be subject to a fine in each case of two hundred and fifty dollars, recoverable, with costs of suit, before any court of competent jurisdiction; said fines and penalties to be paid over to the auditor of public accounts, which sum or sums shall be credited to the educational fund.

SECT. 6. *Be it further enacted, etc.*, That the governor of the State of Louisiana shall appoint a competent person, clothed with police powers, to act as inspector of all stock that is to be slaughtered, and whose duty it will be to examine closely all animals intended to be slaughtered, to ascertain whether they are sound and fit for human food or not, and, if sound and fit for human food, to furnish a certificate stating that fact to the owners of the animals inspected; and without said certificate no animals can be slaughtered for sale in the slaughter-houses of said company or corporation. The owner of said animals so inspected to pay the inspector ten (10 c.) cents for each and every animal so inspected, one-half of which fee the said inspector shall retain for his services; and the other half of said fee shall be paid over to the auditor of public accounts, said payment to be made quarterly. Said inspector shall give a good and sufficient bond to the State in the sum of five thousand dollars, with sureties subject to the approval of the governor of the State of Louisiana, for the faithful performance of his duties. Said inspector shall be fined for dereliction of duty fifty ($50) dollars for each neglect. That said inspector may appoint as many deputies as may be necessary. The half of the fees collected as provided above, and paid over to the auditor of public accounts, shall be placed to the credit of the educational fund.

SECT. 7. *Be it further enacted, etc.*, That all persons slaughtering, or causing to be slaughtered, cattle or other animals in said slaughter-houses, shall pay to the said company or corporation the following rates or perquisites: viz., For all beeves, one ($1) dollar each; for all hogs and calves, fifty (50 c.) cents each; for all sheep, goats, and lambs, thirty (30 c.) cents each. And the said company or corporation shall be entitled to the head, feet, gore, and entrails of all animals, excepting hogs, entering the slaughter-houses and killed therein; it being understood that the heart and liver are not considered as a part of the gore and entrails, and that the said heart and liver of all animals slaughtered in the slaughter-houses of the said company or corporation shall belong, in all cases, to the owners of the animals slaughtered.

SECT. 8. *Be it further enacted, etc.*, That all the fines and penalties incurred for violations of this Act shall be recoverable in a civil suit before any court of competent jurisdiction, said suit to be brought and prosecuted by said company or corporation in all cases where the privileges granted to the said company or corporation by the provisions of this Act are violated or interfered with; that one-half of all the fines and penalties recovered by the said company or corporation in consideration of their prosecuting the violation of this Act, and the other half shall be paid over to the auditor of public accounts, to the credit of the educational fund.

SECT. 9. *Be it further enacted, etc.*, That said Crescent City Live-Stock Landing and Slaughter-House Company shall have the right to construct a railroad from their buildings to the limits of the city of New Orleans, and shall have the right to run cars thereon, drawn by horses or other locomotive power, as they may see fit; said railroad to be built on either of the public roads running along the levee on each side of the Mississippi River. The said

company or corporation shall have the right to establish such steam-ferries as they may see fit to run on the Mississippi River between their buildings and any points or places on either side of said river.

SECT. 10. *Be it further enacted, etc.*, That, at the expiration of twenty-five years from and after the passage of this Act, the privileges herein granted shall expire.

SECT. 11. *Be it further enacted, etc.*, That all laws, or parts of laws, contrary to or inconsistent with the provisions of this Act be, and the same are hereby, repealed.

SECT. 12. *Be it further enacted, etc.*, That this Act shall take effect from and after the first day of June, A.D. (1869) eighteen hundred and sixty-nine.

(Signed) CHAS. W. LOWELL,
Speaker of the House of Representatives.

(Signed) OSCAR J. DUNN,
Lieut.-Gov. and President of the Senate.

Approved March 8, 1869.

(Signed) H. C. WARMOTH,
Governor of the State of Louisiana.

A true copy:
GEO. E. BOVEE,
Secretary of State.

The above Act was, at the extra session of the Legislature in 1877, amended as follows: —

No. 144.

AN ACT TO AMEND AN ACT ENTITLED "AN ACT TO PROTECT THE HEALTH OF THE CITY OF NEW ORLEANS, TO LOCATE THE STOCK LANDING AND SLAUGHTER-HOUSES, AND TO INCORPORATE THE CRESCENT CITY LIVE-STOCK LANDING AND SLAUGHTER-HOUSE COMPANY."

SECTION 1. *Be it enacted by the Senate and House of Representatives of the State of Louisiana in General Assembly convened*, That section one of said Act, number one hundred and eighteen, approved March eighth, eighteen hundred and sixty-nine, be amended and re-enacted to read as follows: "That, from and after the first day of June, A.D. eighteen hundred and sixty-nine, it shall not be lawful to land, keep, or slaughter any cattle, beeves, calves, sheep, swine, or other animals, or to have, keep, or establish any stock landing, yards, pens, slaughter-houses, or abattoirs at any point or place within the city of New Orleans (except the Seventh District thereof), where such keeping or slaughtering shall be limited to the actual consumption therein, or the parishes of Orleans, Jefferson, and St. Bernard, except as aforesaid, or at any point or place on the east bank of the Mississippi River within the corporate limits of the city of New Orleans, or at any point on the west bank of

the Mississippi River above the present depot of the New Orleans, Opelousas, and Great Western Railroad Company, except that the Crescent City Live-Stock Landing and Slaughter-House Company may establish themselves at any point or place as hereinafter provided. Any person or persons, or organization or company, carrying on any business or doing any act in contravention of this Act, or landing, slaughtering, or keeping any animal or animals in violation of this Act, except as herein provided, shall be liable to a fine of two hundred and fifty dollars for each and every violation, the same to be recoverable, with costs of suit, before any court of competent jurisdiction."

SECT. 2. *Be it further enacted, etc.*, That this Act shall go into effect upon its passage, and that all laws, or parts of laws, conflicting herewith be, and the same are hereby, repealed so far as they conflict.

(Signed) LOUIS BUSH,
Speaker of the House of Representatives.

(Signed) LOUIS A. WILTZ,
Lieut.-Gov. and President of the Senate.

Approved May 16, 1877.

(Signed) FRANCIS T. NICHOLLS,
Governor of the State of Louisiana.

XX.

HOW ABATTOIRS IMPROVE THE SANITARY CONDITION OF CITIES.

By BUSHROD W. JAMES, M.D.,
Philadelphia, Penn.

At the meeting of the Public Health Association in 1876, two able and interesting papers on the subject of abattoirs were read by Mr. Henry G. Crowell of Boston, and Dr. E. H. Janes of New York. Mr. Crowell's paper was mainly historical, treating of the various governmental sanitary measures that have been enacted in different countries regulating the business of slaughtering cattle, sheep, etc.; while Dr. Janes's paper was confined to a description of abattoirs and slaughtering-houses of New York City and vicinity. Both papers incidentally alluded to the striking defects and evils of the system of private slaughter-houses distributed through the densely populated districts of our large cities, and both called for a concentration of the slaughtering business in large abattoirs. It shall be my purpose in this paper to go with more detail into this phase of the abattoir question, and to show that both on sanitary and economic grounds the abolition by law of private slaughter-houses is desirable and almost imperative.

The evils of the distributed or private slaughter-house system as compared with the concentrated or abattoir system may be summarized as follows: 1. The necessity of driving cattle through the streets. 2. Carelessness in regard to the condition of cattle when slaughtered. 3. The seeming impossibility of preserving private slaughtering-places perfectly clean and pure. 4. The transportation of offal and waste through the streets, often in an exposed condition, and the discharge of waste solids and liquids into the sewers and often into the gutters. 5. The lack of thorough municipal inspection. 6. The failure to apply improved methods of killing. 7. The wretched moral effect of exposing the process of killing to the public, and especially to children, as is often done. 8. The increased cost as compared with the abattoir system, and consequent increased cost of meat to consumers.

It will be useful to take up each of these evils separately, to determine clearly what it is, to show what are its effects upon the public health and security, and to find what remedy is offered for it by the abattoir system.

I. The evil of driving thirsty, frightened, and furious cattle through the crowded streets of a city, is obvious; yet it is one that is necessarily incident to private slaughter-houses, and must continue as long as they continue. Even in New York, where these houses are near the river, and a city ordinance com-

pels cattle to be landed by boat as near as possible to the slaughtering-place, a certain amount of driving in the streets is necessary; and this in some cities is done in the busiest portion of the day. In Philadelphia an ordinance forbids cattle-driving in the daytime; but at night they create noise, the drivers shout and scream at the animals, and peaceful citizens are aroused and disturbed, to say nothing of the injury to sick people obtaining rest. With all precautions, however, accidents occur; and we frequently read of men, women, and helpless children being run down by angry steers. But apart from mere accidents the practice is a pernicious one. It is liable to accumulate filth in the streets; it often presents unsightly spectacles; and in the excessive heat of summer it causes the cattle to become excited and fevered, so that when slaughtered immediately after driving, as is usually the case, their meat is scarcely fit for human use. This evil is removable with the cause of it, — the slaughter-houses. The large abattoirs that have been built in this country, in nearly every case, are situated so that no driving, at least in the streets, is necessary. The great Brighton abattoir, in Boston, receives its cattle from the cars of the Boston and Albany Railroad. At the Thirty-fourth Street abattoir, in New York City, one of the most complete in the country, the cattle arrive by boat, and are driven through an underground tunnel immediately from their landing-place to their pens, without passing through any portion of a public street. (Public Health Reports, vol. iii., p. 26.) The Philadelphia abattoir is situated between the Pennsylvania Railroad on one side and the Schuylkill River on the other, and the facilities for landing the cattle at the very doors of their pens are ample. Every good abattoir should be so situated as to receive cattle either by cars or boat; and no abattoir, however good may be its appointments, will perform its full service to the public which does not relieve the streets of the nuisance of cattle-driving.

II. The second evil attending the private system of slaughtering is carelessness shown in regard to the condition of cattle when killed. Under the present system (Trans. of Homœopathic Med. Soc. for 1880, p. 128) cattle are taken out of the fields where they have been allowed to roam at large, are driven miles to the cars, where they are packed together in confined spaces, carried to the cities, unloaded and driven through the streets by brutal men and boys, until finally fevered, bruised, and terrified, they are drawn up to a windlass, and, by a blow and a cut, their lives are ended. The question has been pertinently asked whether the meat of an animal killed under such circumstances is fit for human food, even after hours of refrigeration. Mr. Crowell (Public Health Report, vol. iii., p. 17) quotes a vivid description of the condition of animals herded in the pens of private slaughtering-houses by the late Dr. Edward B. Dalton of New York. I will take the liberty of again calling your attention to it. "They are herded," he says, "in small, ill-ventilated pens, — in many cases so crowded as to entirely prevent the cattle from moving about, — where they are kept without food barely long enough for the fever produced by the journey to subside, when they are killed and at once distributed to consumers. While the cattle are thus penned up, they are

the source not only of the greatest discomfort, but of great injury to the health, of the community. The constant bellowing of the foot-sore and home-sick cattle, the ceaseless moaning and bleating of calves and sheep, and the squealing and grunting of pigs, disturb, and indeed oftentimes entirely destroy, the sleep of the occupants of the surrounding tenements, which are generally filled with the laboring classes, who can ill afford to be thus robbed of their natural rest. The emanations from the animals themselves thus kept in unhealthy condition, and from their excretions, keep the atmosphere constantly tainted; while the hordes of rats, flies, and vermin which they attract, render a residence in their vicinity, especially in hot weather, almost intolerable."

This description, besides showing the annoyance which the ill-kept pens of the private slaughter-houses cause to all who dwell near them, also points out that the condition of the cattle kept in them is such that they are in scarcely better preparation for slaughter than if they were strung up on the windlass immediately after miles of driving or riding in hot, close-packed cars. For this evil the abattoir system furnishes a complete remedy. Indeed, without there is gross negligence or gross abuse of the system, the meat that comes from an abattoir must necessarily be in good condition and perfectly fit for food. The Philadelphia abattoir furnishes a good example of the care that is taken to insure the proper preparation of the cattle for slaughter. This abattoir, with its accompanying sheds and pens for the storage of cattle, comprises an area of twenty-one acres. It is centrally located on the west side of the Schuylkill River, about a mile below the dam, or great pool from which the city is supplied with water. Although central, it is isolated by the river on the east and the extensive grounds of the Pennsylvania Railroad Company on the west and south and north. In the rear there is a railway-track, from which the cattle are discharged. The track is so depressed as to bring the platform upon a line with the storage-pens. These pens, one hundred and seventy-two in number, extend in parallel rows through the enclosure, and are kept clean and neat. The spaces between the rows of pens are laid out as streets, and substantially paved with Belgian blocks, and the whole place abundantly lighted with gas. The pens are also paved with granite blocks, and are so graded as to secure quick and complete drainage. The telegraph anticipates the arrival of each train of animals, so that quarters are waiting for them after their long and fatiguing journey, and there is no unnecessary and tantalizing delay. The animals are kept in the pens for two or three days before being slaughtered, and during this time they are carefully fed and watered. The manure which they produce is valuable enough to insure their being properly attended to. The flesh of cattle thus carefully prepared for the market is easily preserved, is healthful, and is in striking contrast with the fevered and quickly decaying carcasses which often disgrace our markets.

III. The third evil in connection with the private system is the seeming impossibility of keeping slaughter-houses perfectly clean and pure. In 1865 the Citizens' Association of New York issued a report on the sanitary condition of the city ("Sanitary Condition of New York, 1865"), which contains some

interesting information on the subject of the slaughter-houses of that city, and shows the private system at its very worst. We read (p. 86) that in one district there were six slaughter-houses, all exceedingly filthy, owing to large collections of offal which was allowed to accumulate before its removal, and which is constantly undergoing decomposition; in another district (p. 168) there were "twelve places, all in a filthy condition, exhaling the most offensive odors, reeking with decomposing offal, and offensive alike to morality and the senses;" in another district (p. 175) were nineteen slaughter-houses, "excessively filthy," and conducted with an utter "recklessness of sanitary regulations and the laws of decency;" in another district (p. 192), in the street where a very foul slaughtering-pen was situated, cases of diphtheria, purulent ophthalmia, and typhus were observed. Fortunately for New York this state of things no longer exists. The abattoir system has been largely introduced, the slaughter-houses have been greatly reduced in numbers, confined to certain portions of the city, and, since 1866, placed under a rigid system of inspection. The condition of things, however, that existed in New York before 1865, no doubt, exists in many American cities to-day; and wherever it does exist it calls imperatively for a speedy reform. It may be said that the cases noted above are only the extreme ones, and that private slaughter-houses, under proper inspection and with due care, can be kept from annoying the public or affecting the public health. This, however, is not proven by experience. Dr. Janes says (Public Health Report, vol. iii., p. 27), that in New York, "notwithstanding the frequent and careful inspections, there still exist evils which are inseparable from this system of conducting the business in a number of small and detached buildings. Each establishment regulating its own hours of work and its own time for cleaning, and each proprietor establishing his own standard of what he considers cleanliness, the neighborhood of slaughter-houses is rarely exempt from the noxious effluvia so closely associated with this business. It is not unusual to find, immediately after a slaughter house and yard are supposed to have been cleaned, particles of offal adhering to the walls of the buildings or along the fences, or caught in the interspaces of the rough pavement; portions of manure adhering to the fences, or in the corners of the yard; pools of bloody water in the depressions of the uneven pavement, or streams of surface-drainage, made filthy with manure and blood, finding their way over the adjoining sidewalk to the street-gutter." Contrast this picture with the complete and thorough method of cleaning an abattoir, which we shall presently speak of, and the moral is obvious.

IV. The next evil in connection with the private system of slaughtering is that connected with the disposal of the waste. The parts that are not actually collected are thrown into the drains or gutters, and are often carried for some distance over the surface before they reach the sewer. One of the most filthy slaughter-houses in New York was situated in a back lot. The drainage was over the surface of the yard, on to the sidewalk into the street-gutter, where the blood was mixed with water: it then ran two-thirds of the block before it found its way into the inlet of the sewer. The children of the neighborhood

played in this mixture. Not only the fluids, but also some of the solid parts, are thus carried into the sewers. The bulk of the waste, however, is collected and carted away, the private slaughter-houses not being able to use the expensive apparatus necessary to separate the fat and reduce the offal to the pulverulent fertilizer of commerce. The waste thus taken away is often exposed in open vehicles in the streets: more or less dripping takes place, and the atmosphere is sure to be tainted. The final destination is usually the bone-and-fat boiling establishments, and thus this system gives to these nuisances and pests of a city a *raison d'être*, which, under an exclusive abattoir system, they would scarcely have. The primary cause of slaughter-houses being usually nuisances is, that there is no special profit to be made from strictly economizing the waste; and it is consequently neglected. If every particle of waste could be made into product which would yield even a moderate profit to the keeper of a slaughter-house, we should probably not have to complain so often of his establishment. It is just in this matter that the great superiority of the abattoir system arises; that is, in the utilization of the waste. Upon this depends the cleanliness of the abattoir, its utility to the public, and its profit to its proprietors; for all that is usually demanded of the butchers for slaughtering their cattle is the waste. The abattoir company can utilize every particle of the waste: it is, in fact, the sole profit; and hence it is not to their interest to let any of it slip from them to become a nuisance to the public. The Philadelphia abattoir, though not the largest in the country, is one of the most complete in its arrangements; and a brief description of its methods of utilizing waste will serve the purpose of pointing out the advantages the abattoir system has over the private system, apart from the obvious advantage of having all slaughtering concentrated in one place. This abattoir consists of a large, ornate building, with a frontage on the Schuylkill River of a hundred and ten feet, and running back a hundred and ninety-five feet. Ventilation is secured by numerous windows in the sides. At the end there is a large, clear window, which can be opened; and there is also ridge-roof ventilation. The essentials of light and air are thus provided for. The basement extends under the whole building, and both the main and basement floors are covered with asphaltum pavement. On each side of the middle aisle is a range of pens enclosed by an iron-pipe railing. The cattle are kept in these only while they are waiting their turn to be slaughtered. Outside the pens is the slaughtering-floor, extending on both sides the length of the building. Opposite each slaughtering-pen are the apparatus of improved kind for hoisting the carcasses. Each slaughtering division is provided with hose, and hot and cold water. When the carcass is strung up, an attendant is at hand with a large circular pan, which he places under the animal so as to catch all the blood possible. The blood and the offal are then removed to that part of the building used for the utilization of these substances. A slight incline of the floor causes the water and the blood that cannot be saved to flow towards the river. Before it leaves the building, however, it flows through a grating and filter, which prevents any of the solid parts from passing into the sewer. The sewer enters

the river below low-water mark. The hides are dropped through man-holes to the basement below, and immediately salted and shipped to the tanneries. The manure is collected in cars, and also immediately removed. As soon as slaughtering is finished each day, the intestines, offal, rough fat, etc., are placed in the Craven drier, which consists of a cylindrical tank, five by fifteen feet in dimensions, with three man-holes, two of which open on the level of the slaughtering-floor. In the tank there is a shaft with radial arms, the shaft connected with the engine by pinions and belts. When the refuse matter is placed in the tank, steam is introduced, and the fat separates from the tissue. Water is then introduced; and the fat rises, and is drained off through pipes to the receivers in the basement below. The rough fat is usually rendered first. After the two renderings have been made, the blood that has accumulated during the day is added to the refuse from the renderings, the shaft with the radial arms is set in motion, steam is introduced, and the process of beating, pressing, and drying begins; and, when it is ended, the only product left is a dry, pulverulent substance, with the appearance, consistency, and dryness of ground coffee. This is sold as a fertilizer. No offensive or noxious vapors or odors are noticeable. The gases given off are conveyed up a tall stack, which is connected with the drier. But probably a better method of disposing of them would be by means of a pipe into the river, as is done in the Thirty-fourth Street abattoir, New York. The amount of waste or refuse matter which each day leaves the building in a form which might affect the public health is almost nothing, — only a little gas which nobody has ever noticed, and about fifty or sixty gallons of blood, which is scarcely a trace in a river like the Schuylkill, which has an ebb and flow of the tide of over 129,000,000 gallons twice a day. The dry, hard fertilizers, the press-manure, the salted hides, and the carcasses can do no harm.

V. The next objection to the private system is perhaps a trifling one; but it is one that at least ought to be noted. It is the failure to apply improved methods of killing. In the Philadelphia abattoir cattle killed for foreign markets are first strung up, and then the throat is cut. This secures an exhaustion of as much blood as possible. Beef for the city use is still killed by the old method of the blow and cut. At the Philadelphia abattoir cattle waiting for slaughter are kept in open pens made of iron-pipe railing. They see the whole process of killing, and yet stand quiet, making little or no noise or disturbance. By the old method, when they were placed in close pens and caught the odor of the blood without seeing what was going on, their moanings were distressing. The plan of spearing the spinal cord at the neck, by a long instrument pointed with sharp iron, by a man standing on a platform above the animal, has been abandoned at this place. Less cruelty is apt to be practised in abattoirs than in private houses.

VI. The objection as to the lack of proper municipal inspection is one of considerable importance. Slaughtering and butchering for the markets is generally done on one or two days in a week simultaneously by all the butchers. This system would require the simultaneous inspection of the slaugh-

ter-houses, and would necessitate the employment, at great expense, of an immense force of inspectors. As things are now, this is practically impossible; and the consequence is, that the slaughter-houses, except when they become decided nuisances, are in most cities practically exempt from inspection. And yet there are no places over which the public are more interested in having a proper surveillance. Apart from mere sanitary regulations, which they are prone to disregard, these places are constantly sending into the markets meat totally unfit for use. Under proper inspection diseased beef, trichinous pork, and immature veal, which human fiends, actuated by cupidity and avarice, are constantly preparing as food for their fellow-mortals, would be practically shut out from our markets. But this inspection, thorough as it must be to be effective, is not to be had in any distributed system of slaughter-houses. It is possible in the abattoir system. In the largest abattoir three or four inspectors would be amply sufficient to prevent any abuses. If all the slaughtering for a great city was done in one abattoir, the municipal authorities would have a control over the business which they could not obtain over private slaughter-houses by the expenditure of thousands; and yet how many valuable lives, and how many days of grievous suffering and pain, would be saved to every community by such control!

VII. Another objection to the distributed system is, that the slaughter-houses are often so situated or arranged that the killing can be watched by a crowd of curious on-lookers. The moral effect of this, especially on children, is pernicious. To accustom the minds of children, susceptible and plastic to impressions as they are, to scenes of blood, suffering, and often cruelty, can result in little else than to make them hard, cruel, and depraved men and women. If slaughter-houses must exist, their operations should at least be completely hid from the public gaze.

VIII. The last objection to private slaughtering is the increased cost as compared with the abattoir system. It may be thought that this has no concern with sanitation; but any improvement which will afford cheaper, and therefore more abundant, food to the people seems properly to come under the head of sanitary reform. The saving to the butcher is effected by the principle of co-operation. In the Philadelphia abattoir the slaughtering-floor, with the adjacent pens, is divided off and rented, sometimes to one butcher who does sufficient business to take a compartment by himself, but oftener to a number of butchers who club together. The hides and fat are sold to the abattoir company at market prices, while the waste goes to the company for its services in slaughtering. The result of this is, that a butcher, who, under the old system, would slaughter five or six cattle a week, and who, therefore, would be obliged to keep a small slaughter-house in his yard, as well as a horse and cart, is enabled to club with others and take a compartment for two hundred and fifty or three hundred dollars a year, the cost to him not being more than forty or fifty dollars. He is saved the expense of driving cattle through the street, the capital invested in the construction of his slaughter-house, the value of the annual rental of the real estate on which the

house is situated, and perhaps the cost of a horse and cart. This saving will at first accrue to the butcher alone; but his unusual profits will attract others into the business, the price of meat will fall by competition, and in the end the public will be the gainer.

The consideration of the advantages of the abattoir system must convince every one who is familiar with them, that it is the system which every motive of public utility calls for adoption. Already it has been tried in several of our large cities; and, as public opinion becomes more enlightened, it will no doubt be established in every city and town where the population is great enough to support it.

XXI.

DISEASE AMONG TEXAS CATTLE.

By JOSEPH R. SMITH, M.D.,
Surgeon U.S.A.

The opinion exists among many persons that disease prevails extensively in Texas cattle; that a disease prevails, epidemic and contagious, to such an extent as to raise the suspicion that Texas is, or soon may become, unsafe as a source of supply of beef for the market of the Northern States.

The correctness of this opinion I have endeavored to test, and, with this end in view, have talked on the subject with cattle breeders and drovers as many as I could meet.

I have also written to various persons (medical men and others) in different sections of the country whence it seemed probable that definite information on the subject might be obtained, and have asked answers to the following questions: —

1. What is the age of the animals slaughtered at your post or in your neighborhood? (Age of each for a period of time.)
2. The age of the oldest animal of whom you can learn in your vicinity, and the cause of death when they have died.
3. Does the pericardium contain bloody serum?
4. Are there any ecchymoses on the outer or inner surface of the heart?
5. The weight of the liver.
6. Does the liver show any signs of fatty degeneration?
7. Does the gall-bladder show any reddening?
8. What are the length, breadth, and weight of the spleen?
9. Its color and consistence.
10. Do the pelves of the kidney show a bright red color? a dark color? or are they streaked with blood?
11. What is the color of the lining-membrane of the bladder? and does it show any traces of hemorrhage?
12. What is the color of the lining-membrane of the fourth or true stomach? Is it flaccid? or stained? or spotted with petechia?
13. What is the rectal temperature of the animals? or a few of them? (This can be obtained by throwing them just before they are killed.)
14. Do you notice any pathological appearances other than those suggested above?
15. Do you know or learn of any disease prevailing, or epidemic, among the cattle in your vicinity?

16. Have any Northern cattle been imported in your vicinity? bulls or cows? If so, did any become sick after emigration? and were any special precautions taken to preserve their health?

17. So far as you can learn, what is the annual mortality among the herds in your vicinity, and the cause of death among them?

18. Any facts you may be able to obtain bearing on the life, disease, fitness for food of beef cattle, either while in pasture or being driven to Northern markets.

The replies received thus far are embraced in the following table: —

	To 1st Query.	To 2d Query.	To 3d Query.	To 4th Query.	To 5th Query.	To 6th Query.	To 7th Query.	To 8th Query.	To 9th Query.	To 10th Query.
Surgeon W. E. Waters, U.S.A., Ft. McKavett, Texas, on the head-waters of the San Saba.	2½	*Oldest.* 25 *Cause of Death.* Old age or exposure.	No.	No.	Varying only a few ounces from 9 lbs. in the 2½-years-old cattle. The older one had a liver weighing 14 lbs.	No.	No.	18 or 19 in. length; 5 inches at widest part; a little over 1 inch thick at thickest. Weight, 1½ to 2 lbs. Only 3 or 4 weighed as little as 1½.	Color similar to healthy liver. Slightly bluish externally. Inclined to flabbiness, more than human spleen.	Light red, not streaked, apparently normal.
A.A. Surg. T. B. Davis, U.S.A., Corpus Christi, on the Gulf of Mexico.	7+	25 Old age.	No.	No.	Average, 10 lbs. 14 oz. Maximum, 15 lbs. Minimum, 8 lbs.	No. In 2 cases multiple abscesses, small, conjoined with congestion. In one specimen, small calcareous deposits.	No. Pinkish when fresh, and changing to greenish.	19½ in. in length; breadth, 5⅝ to 4.9. Av. weight, 1 lb. 5½ oz.	Mottled blue or grayish externally; dark red internally; soft, brittle, easily broken down and very vascular.	White, with blush of pink,—never pronounced. No evidence of congestion.
A.A. Surg. J. R. Hamer, U.S.A., San Felipe, Texas, near the Rio Grande.	3 to 6	12 Injury.	No.	No.	8 to 8½ lbs.	No.	Slight.	15½ in. by 4½ inches average. Average, 2 lbs.	Dark red and mottled; firm consistency.	Dark color, free from blood-streaks.
Asst. Surg. H. E. Brown, U.S.A., Ft. Duncan, Texas, at Eagle Pass, on the Rio Grande.	2 to 4	None very old. Cause of death not certain.	No.	No.	5 to 8 lbs.	No.	None.	8 in. to 1 ft. long, 2 to 3 in. broad. Weight, 1 to 1½ lbs.	White.	Bright red color.
Asst. Surg. W. C. Gorgas, U.S.A., Ft. McIntosh, Texas, at Laredo, on the Rio Grande.	4—	No reply.	No.	All hearts normal.	7½ to 8½ lbs. Maximum, 10 lbs. Minimum, 5½ lbs., in a yearling.	No.	Normal.	Size not given. Weight, 1½ to 1½ lbs.	Normal in color and consistency.	Normal.
Surg. A. Heger, U.S.A., Ft. Clark, Texas.	3 to 5	20 Old Age.	Not known.	Not known.	Average, 10 lbs.	Not known.	Not known.	Not known.	Not known.	Bright red color.

	To 11th Query.	To 12th Query.	To 13th Query.	To 14th Query.	To 15th Query.	To 16th Query.	To 17th Query.	To 18th Query
Surgeon W. E. Waters, U.S.A., Ft. McKavett, Texas, on the headwaters of the San Saba.	Slightly yellowish white, or cream color. No trace of hemorrhage.	Greenish drab. Not stained, or flaccid, or spotted, or any appearance of petechia.	Not taken.	None.	Remarkable freedom from disease.	Yes. Bulls and cows. Were speedily taken sick with Spanish or Texas fever, and the majority died; some from the disease, and some suffocated by pouring medicine into the lungs. No prophylactic measures.	Less than 2 per cent from disease. Cause of death, exposure during severe weather, and when debilitated.	Know nothing additional.
A.A. Surg. T. B. Davis, U.S.A., Corpus Christi, on the Gulf of Mexico.	Faint pink. No indication of hemorrhage.	Dull red, varying in intensity; flaccid, in two instances showing stain or petechial spots.	101° 4′ in a gentle animal just before slaughter. Average, 103° 38′. Maximum, 105° 2′. The animals were excited and terrified, and the observations were made immediately after death in the most.		Have made extended inquiries, and cannot learn of any disease or epidemic prevailing among the cattle in this vicinity.	Many introduced, and many died of climatic causes. I cannot say as to precautions taken.	Cannot find out.	Know nothing additional.
A.A. Surg. J. R. Harmer, U.S.A., San Felipe, Texas, near the Rio Grande.	Straw colored, or light drab, tinged with yellow. No trace of hemorrhage found.	Pinkish white; flaccid.	98°.	Partial atrophy of the right lung in one instance. None.	Is not, nor has been.	None imported.	Cannot find out death-rate. Cause of death appears to be injuries and over-driving.	Know nothing additional.
Asst. Surg. H. E. Brown, U.S.A., Ft. Duncan, Texas, at Eagle Pass, on the Rio Grande.	Yellow. No traces of hemorrhage.	Bluish color; not flaccid, or stained or spotted with petechia.	Information not attainable.	None.	No.	None.	About 1 per cent. Cause of death, chiefly accidents.	No reply.
Asst. Surg. W. C. Gorgas, U.S.A., Ft. McIntosh, Texas, at Laredo, on the Rio Grande.	Normal.	Normal.	Not taken.	The livers in all cases were markedly yellow, and somewhat softer than they should be. The color had the appearance of bile staining, though there was no catarrh of gall-duct or small intestine. The natives attribute it to the animal eating cactus. Only one liver could I call diseased (weighed 10 lbs.). This was firmer than usual; at several points the proper substance of the organ was replaced by a firm white tissue resembling cicatricial tissue. All other organs normal, and the animal before death apparently in good health.	No reply.	No reply.	No reply.	No reply.
Surg. A. Heger, U.S.A., Ft. Clark, Texas.	Not known.	Not known.	Not known.	Not known.	Not known.	None.	Thieves alone.	Not known.

Other letters in reply to my inquiries are on the road, or have been received at too late a date to embody in this paper.

In comparing among themselves the replies herewith presented, very great discrepancies will be seen, the most striking referring to the pathological appearances.

The age of cattle slaughtered ranged from two and a half years at Fort McKavett to a little over seven years at Corpus Christi.

The weight of the liver varied from five and a half pounds in a yearling to fifteen pounds in a beef slaughtered at Corpus Christi. As a general rule, the weight of the liver increased with age.

The liver and gall-bladder are reported generally as healthy.

Of the spleen, the size is reported at Fort Duncan as eight inches to a foot in length by two to three inches broad, the thickness not being given; while at Corpus Christi it is reported as nineteen and one-third inches in length by five and two-thirds to four and nine-tenth inches in breadth, the thickness not being given. The average weight reported is one pound and five and one-half ounces at Corpus Christi, and two pounds at San Felipe. The extremes are not reported. Its color is reported respectively as white; dark red and mottled; and mottled blue or grayish externally, and dark red internally. And its consistence is described as soft; brittle; easily broken down and very vascular; as firm in consistency; and as more inclined to flabbiness than the human spleen.

The pelves of the kidney are described as light red, not streaked; as white, with blush of pink; as of dark color; and bright red, by two observers.

The lining-membrane of the bladder is generally described as of yellowish hue; one only describing it as faint pink. The color of the lining-membrane of the abomasus is represented as greenish drab; as dull red; as pinkish white; and as bluish white. The organ itself is further represented by two observers as flaccid, by two as not flaccid, and by one simply as "normal." By only two observers is the rectal temperature reported. Dr. Haemer, at San Felipe, reports it as 98°, and further says, "The operation was performed as carefully as possible. I think the observations are correct."

Dr. Davis of Corpus Christi reports the average temperature of five animals as 103° 88′, with maximum 105° 2′, and minimum 101° 4′. He further reports, "Owing to the wildness of the cattle, and the want of proper facilities, it was found impracticable to carry out the suggestions offered relative to the manner of making the observations. The mode of slaughtering is by severing the spinal cord in the cervical region by means of a sharp lance thrust into the neck of the animal from above; and in four of the above cases the observations were made immediately after the animals had been stricken down. They were laboring under intense excitement and terror, and were with great difficulty driven into the slaughter-cage, which doubtless affected the range of temperatures. The minimum case recorded above was that of a comparatively gentle animal, and the temperature was taken before being slaughtered."

Some of these differences, as seen in the reports, are doubtless to be ascribed to the greater or less familiarity with the pathological appearances presented. Some may be due to more or less imperfect sense of color, color-blindness, and some to the personal equation of the observer, — the same consistency, for instance, appearing as "flaccid" to one, and not "flaccid" to another.

To the question, however, whether any epidemic prevails among the Texas cattle, there is but one answer, — No. While the figures given are insufficient to furnish answer to the question as to the annual mortality, the answers are sufficiently definite to show that the mortality is small, and that ordinarily death only ensues from injury, exposure to inclement weather, starvation, or old age. This is true, however, only of Texas-bred cattle. The improved stock of Northern cattle imported into the State have met with a sad fate, by far the greater number dying within a few months of their arrival. To illustrate, I will quote from an exceedingly interesting letter written by Mr. B. F. Gooch, a stock-raiser living near Mason, Tex.: "In 1874, I purchased in Kentucky and Kansas fifty-three head of short-horn Durhams, — eighteeen females and thirty-five males, — ranging from six months to six years old, all thoroughbred, pedigreed animals but three, and arrived at Mason, Tex., with them the thirteenth day of December. When within two and a half miles of this place, one of my yearling bulls died with the Spanish or Texas fever; and from that time on, for thirty-five days, they continued to die until I had but sixteen of the fifty-three living. I tried about all the remedies recorded in 'Clater's Cattle Doctor,' 'American Cattle' by Allen, besides many other remedies that all the 'Dicks, Toms, and Harrys' who came along knew, all to no avail. In fact, it looked as though every one I doctored at all died, but one yearling bull, to which I gave copperas in corn-meal gruel. I imagine it did him good; and one heifer was made to swallow freely, at different times, raw eggs, and she got well, and is living to-day. But, just here, let me say to the credit of Dr. Clater referred to above, that just what he says in his work (pp. 262, 263) about drenching cattle, was experienced in nearly every instance with my patients. The poor cattle were suffocated by the medicines being poured down their wind-pipes, and entering their lungs instead of their stomachs. When I had read him on the subject of drenching, I opened the lungs of one that had died, and found a considerable portion of the medicine in the lungs; and I confidently believe a number of my cattle that died would have lived if nothing had been done for them. . . . The sixteen head that lived all had the fever, and, with the exception of the two alluded to, got well without any treatment. Out of the eighteen females brought here in 1874, I saved three yearling heifers, from which I have had seventeen increase, fourteen of which are living."

Similar are the mortality reports from every other cattle-breeder whom I have questioned. Capt. Richard King of Santa Gertrude's Ranch, the largest ranch in Texas, who numbers his acres by hundreds of thousands, and his cattle by tens of thousands, informs me that among the fine cattle, Dur-

hams, imported by him, the mortality within the first year was fearful; while, among those bred by him on his ranch, death from disease — that is, from any cause other than those above named — was of the rarest occurrence. It is not certain whether the cause of this mortality is climatic or dietetic. Some maintain that the Spanish or Texas fever is nothing but a process of acclimation; that it is due to new conditions of sunshine, moisture, and temperature; and that it affects all animals, human beings as well as the four-footed.

On the other hand, some maintain that the sickness is caused by change of food. Not only different grasses and grains, but the pastures in these latitudes are full of larvæ and insects of various kinds, noxious when taken into the stomach.

I am told that one or two varieties of distoma have been recognized; and the embryo of *tænia saginata*, it is well known, is found in the flesh of the cattle, whence occurs the prevalence of this variety of tape-worm among the people of Texas. And it is a fact that tape-worm is more prevalent in this State than anywhere else that I have ever been stationed. These are simply popular beliefs as to the cause of the prevalence of mortal diseases among imported stock in this State.

The question, then, must still be regarded as *sub judice*.

As bearing on this question, I may state, that, in the special report from the Department of Agriculture for 1879, — being an investigation on diseases of swine, and infectious and contagious diseases incident to other classes of domesticated animals, — appear reports from thirty counties of Texas as to the prevalence of diseases among domesticated animals.

In twenty-four counties it is either stated that little or no disease prevails among cattle, or inferentially it is made so to appear by the failure to mention such prevalence. Six counties report as follows: —

Austin County. — "A strange disease has been prevailing among cattle in the northern part of the county, and every animal attacked has died."

Hopkins County. — "And cattle [are affected] with bloody murrain."

Kerr County. — "Fifty-four cattle have died during the present year of dry murrain. The condition of all farm animals, however, is a little better than the average."

Titus County. — "Cattle are affected with murrain and black tongue; and nearly all die that are attacked by these diseases. Many also die from feeding on acorns."

Upshur County. — "A good many cattle and hogs have died in this county during the past year of diseases peculiar to these classes of farm animals."

Uvalde County. — "And cattle [die] of lung fever and spinal diseases."

In the report on the same subject for 1880 appear statements from thirty-two counties. Of these, twenty-four report freedom from disease, the same as the report for 1879. Eight counties report as follows: —

Camp County. — "Several cattle have died of bloody murrain."

Chambers County. — "I am led to believe that the losses . . . from disease in this county for the last year will amount to . . . at least twenty thou sand dollars" (of cattle).

Eastland County. — "A few calves and yearlings died in this county last spring of a disease called 'black leg.'"

Gillespie County. — "Some eight or ten head of calves recently died here of black tongue. Horses, cattle, and sheep are in a healthy condition."

Kerr County. — "A good many calves and yearlings are now affected with a disease known as 'black leg.'"

Lamar County. — "A great many diseases have prevailed among farm animals in this county during the past season, and the losses have been heavier than usual. I estimate the losses . . . of cattle at ten thousand dollars."

Uvalde County. — "Cattle here are mainly afflicted with some kind of slow fever, known generally as 'Spanish fever.'"

Walker County. — "Murrain is prevalent among cattle, and but few attacked recover."

These reports are too indefinite to warrant the formation of precise conclusions. But in the absence of definite statements as to numbers, and as to whether the affected cattle are imported or home-bred, they are far from proving the prevalence of epidemic disease among the Texas cattle.

In regard to cattle driven from this State to the Northern markets, the assertions of all drivers with whom I have communicated are perfectly positive; viz., except from starvation or over-fatigue or exposure, they lose no cattle on the road. I have this day (Dec. 1) conversed with a Northern dealer in cattle who buys thousands in Texas every year, and drives them to his Northern ranch, where they are either bred from, or fattened for the market. He says he has now about five thousand Texas cows on his ranch; and no disease exists among them, or has ever followed their arrival at their new home from the road.

In this connection I insert a quotation from the letter before quoted of Mr. B. F. Gooch: —

"It is so seldom that an animal dies on the route North from any disease, that it would not be worth mentioning. Starvation kills a great number in some herds. When men from their great anxiety to make money have bought up in the fall of the year large numbers, and thrown them into small pastures [large pastures in acres, but small in grass compared with the number of cattle] during the winter, and by reason of having overstocked the pasture they are forced to take them out in the latter part of the winter before grass, and start them on the trail, they have often met with heavy losses. But where cattle have had a reasonable pasturage during the winter, and not placed under close herd before grass in the spring, and are then started on the road North, although they may be poor at the time of starting, they increase in flesh and strength from the very first until they reach Kansas or Nebraska; and there is no loss by death, unless killed in a stampede or drowned in swollen watercourses in the drover's haste to get to market."

I am aware that the facts I have here given are not in conformity with the opinions which have been entertained and promulgated by some others.

Thus Dr. Salmon, in his report to the Commissioner of Agriculture, defines

"the Southern cattle-fever," under its different synonymes, as "an exceedingly fatal epizoötic, specific, communicable fever of cattle, at present confined to regions south of the thirty-seventh parallel of north latitude, except as communicated to cattle north of this line by cattle brought from south of it," etc.

The whole of Texas is included by this boundary. Dr. Salmon further says, "Not very much is known of the disease in Texas, except that it is very difficult to acclimate thoroughbred cattle on account of it." Mr. Mark Huselby of Fort Elliott, Tex., in a letter to the "National Live-Stock Journal" (1879, p. 258), says, "It is much more extensive than you seem to be aware of; for, in the section of the country known as the Panhandle of Texas, I might make a fair estimate by saying that a thousand head of stock die annually from that disease. . . . We suppose it to be contagious in Texas, though cattle seldom die of it. What are known here as American, Colorado, and Mexican cattle, when brought in contact with Texas cattle, almost invariably suffer severely."

Mr. Huselby's description does not conform to Dr. Salmon's definition, certainly, as to mortality, and seems to confirm the statements in the first part of this paper that the disease rather affects the imported and not the Texas-bred cattle. Further on, in the same report, reference is made to certain *post-mortem* appearances in Texas cattle, which seem to show that a disease of some kind affected native Texas cattle driven North, and that the pathological appearances in a large number of apparently healthy Texas bullocks were similar to those found in cases of Spanish fever. If these observations are confirmed, they prove too much: at least their interpretation is doubtful.

This paper does not profess to be an essay on the diseases of cattle in general; and I therefore make no mention of them, save to say, that, to my inquiries of stockmen and butchers, the reply is made, that, of course, individual cases of very many cattle-diseases occur, and that whenever cattle are crowded in comparatively small pastures or stockyards or stables for fattening, as they mostly are in the vicinity of large towns, more frequent cases of disease occur.

As far as my inquiries extend, they seem to lead to the conclusion, that no epidemic disease prevails among the Texas-bred cattle living and grazing in that State, but that imported cattle, soon after their arrival, are affected by a disease called Texas or Spanish fever, which is very fatal to them alone.

I regret that I am not able to present a larger number of precise answers as to the pathological appearances in the cattle killed. These, however, I hope to obtain during the coming year, and embody in a more complete report, to be offered at the next meeting of the Public Health Association.

To acquire exhaustive information on the subject, researches should be prosecuted from both ends of the line, — from the breeding-places and pastures, and from the slaughter-houses, the history of all animals found diseased in the Northern slaughter-houses being carefully traced back to their homes.

XXII.

SANITATION AND EDUCATION.

By Hon. JOHN EATON, LL.D.,
Commissioner of Education, Washington, D.C.

In calling attention to education and sanitation I shall not attempt any exhaustive treatment of the manifold relations between them.

Every one asks with supreme interest, "How long shall I live, and under what conditions?" The energies of the individual and of civilization are invoked to prolong life and increase its comforts and success. The story of this struggle for life requires in its rehearsal none of the imagery of poetry: figures tell it in the shortest terms. The last complete census of our own country (that of 1870) shows that over forty per cent of the population die under five years of age. Nearly half of the mourning is over the deaths in these tender years. How large a proportion of the population is ill on any given day has not been ascertained. But, as showing the supply or the lack of the comforts of life, Dr. Jarvis, an expert in these statistics, points out that the white population is about evenly divided between those that are self-sustaining and those that are dependent; while of the colored population fifty-five per cent are dependent.

Education and sanitation represent great forces invoked by man in the endeavor to prolong his life and improve his condition, — the one, the science and art of culture; the other, the science and art of health. As terms they may not always have been present in the vocabulary of the ancients; but the ideas they express, the facts which they include, and the objects at which they aim, are ever present in human endeavors, and are as universal in man's experience as death and sickness and ignorance, which they antagonize.

Man finds for himself, as for all the lower orders of animal and vegetable life everywhere, over against the law of good, the law of evil: the nerve that tells of enjoyment is the nerve that tells of suffering. The principle of growth may be everywhere applied to pervert or perfect, and in its neglect appears the law of decay. Wrapped in the same bundle are the laws of health and disease. Since impressed with the image of his Creator, and receiving the command, "Be fruitful and multiply and replenish the earth, and subdue it and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth," man, as the crown of this visible creation, has found it possible to bring under control, for his good, all of his own powers, and all of the forces and conditions of nature around him. Slowly, with halting and with sometimes backward step, and generally

through devious course, man has reached his present marked degree of facility in commanding the secrets of nature. In the place of the wigwam or cave of the savage, he rears the mansion of civilization, ventilated and heated to increase health, promote length of days, inspire his purity, and please his sense of the beautiful.

For his food he transforms the crab-apple into the pippin, the bitter almond into the luscious peach, the wild ox into the Alderney or the Durham, the wild sheep into the improved Saxon. He makes the barren soil productive; he transforms the malarial or poisonous conditions of his habitat into the salubrious and healthful. For clothing he no longer tolerates the leaf of the tree or the rude skin of the animal, but adorns himself with garments wrought by the highest skill from the improved cotton, the cultured merino, the developed silk, and adorned with colors as rich as the famed Tyrian or Venetian dyes. His spiritual, intellectual, and æsthetic aptitudes are supplied by invoking a corresponding change in agencies, objects, and instruments. The resistance to comfort and health offered by time and space he assails with the powers of steam and the velocity of the lightning. In all this transformation he has applied the semi-creative principles of culture, at once so simple and so universal. In his observation and experience he has found a certain uniformity, a certain order of relation of facts, which he has called law. He found the relations of cause and effect, that establishing one condition produced another; he could do this for himself, or he could teach to others the principles which he followed for his own benefit. This is education, which imparts knowledge, and nourishes or trains. Beginning with every one of us before we reach the cradle, it cannot end before the termination of this mortal existence. It may be perverted and bad, and hasten human ills: there is education in crime even. Indeed, criminals have a life and language of their own, and have attempted the preparation of literature, as well as of implements of their business. If the purposes or methods of education are an admixture of what ought and what ought not to be, the results must correspond, and at best can be only partially good. We may conceive education to be wholly good, and yet we rarely find it so in this state of imperfection. It may be wholly bad, and yet it is not often so, even in savage life. The instincts of self-preservation, the pure selfishness of nature, finds out and employs some of the right processes of education or betterment. Education may — nay, must — go on either by neglect or by intent: human conditions cannot be stationary. Right education for its highest ends adopts the precepts of morality toward man, and piety toward God. It practises and teaches conformity to the laws of matter and the laws of spirit. Wherever in thus carrying forward human progress it encounters disease of mind and body, or trains in the practice of health or teaches its doctrines, it enters into relations with the science and art of sanitation.

Just as a right education is a preventive of crime, and cheaper than the machinery for its detection and punishment, so is sanitation a preventive of disease, and cheaper than the appliances for its cure. This right education

should train the child, the adult, and the community, in the precepts of sanitation, so that every individual may have secured to him that first requisite of power, labor, and happiness, a sound mind in a healthy body. Education is false or impotent without the doctrines or training of sanitation. As the natural constitution itself may be healthy or unhealthy, so may that second nature, aided by education, which we call habit. Put unhealthy treatment to a diseased system, and how soon that system will vanish like vapor! On the other hand, bring up the child of sound mind and body in the knowledge and practice of the principles of health, and what a promise there is for his maturity and vigor!

These doctrines are not new: indeed, they are so old, and recur so frequently in literature, that the statement of them may seem stale, though required by the exigencies of the day. The philosopher finds them illustrated in all his comparative study of races, nations, and systems of belief. The Jew and Christian note them in the remarkable sanitary code given the Hebrews. Pointing to the restraints it imposes on man's destructive passions and appetites, to the healthfulness of its moderation, to its rules for cleanliness, to its rules for eating meats, and to its classification of things as clean and unclean, they pronounce the descendants of Jacob, — scattered in every nation and every clime, — so full of physical and mental vigor, ever-present indications of the excellences of this code given in the infancy of the race. The Levitical priesthood appears not only as presiding at the altar over the rights of man's worship of Deity, but as the depository of learning for their own and the other tribes, and as especially taught in all the knowledge of preventive and curative medicine possessed and practised in their times. The same was true respecting the Egyptians, among whom the Israelites were so long in bondage. Herodotus found the Egyptian priesthood a sort of nobility, whose education included not only instruction in history, national and civil, astronomy, geometry, jurisprudence, and civil polity, but in medicine. Jahn observes, that "they were practising physicians, inspectors of weights and measures, surveyors of lands, astronomical calculators, keepers of the archives, historians, receivers of the customs, judges, counsellors of the king, who was himself a member of their order."

Hippocrates ascribed the origin of medicine to the discovery that the sick were injured by the use of food which was beneficial in health. But the progress of the science or art of medicine, whether curative or preventive, has even been dependent, like that of mathematics or chemistry, or any science or art, upon education. Education must teach, train, and prepare the men that make its discoveries and announce its precepts, and must also teach them to others, and thus disseminate a knowledge in them for general benefit.

Greek history and literature present interesting illustrations of the interweaving of the precepts and practices of education and sanitation. Mitford considered it remarkable that Homer nowhere speaks in plain terms of sickness. He, indeed, mentions diseases, but as the effect of the immediate stroke of Deity. The marked desire of the Greeks for physical excellence

inspired them to lead a course of life conducive to health. Homer has left us many pictures of feasts and relaxations, and once mentions drunkenness as a warning example.

Exercise was the delight of his heroes, and excellence in manly sports their pride. The Phocions exhibit their games before Ulysses, that he may relate, —

> "How in the boxing and the wrestling match,
> In leaping and in running, we excel."

Grote observes that Greek towns were built "at some distance inland, on a rock or elevation which could not be approached without notice, or scaled without difficulty," thus furnishing conditions favorable to pure air and to good drainage, and to the ideal town of Plato. This philosopher calls attention to the fact that Homer feeds his heroes, when they are campaigning, on soldiers' fare. They have no fish, though they are on the shores of the Hellespont. Sweet sauces are not even mentioned by him.

It has been held that the laws of Lycurgus, in force seven hundred years, made a race totally different from any other. Plutarch says, "The most masterly stroke of the great Spartan lawgiver was the ordinance that he made, that all should eat in common of the same bread and same meat, and of kinds that were specified, and should not spend their lives at home, lying on costly couches, delivering themselves into the hands of their tradesmen and cooks, to fatten them like greedy brutes, and to ruin not their minds only, but their very bodies, which, enfeebled by indulgence and excess, would stand in need of long sleep, warm bathing, freedom from work, and, in a word, of as much care and attendance as if they were continually sick." Their public repasts were schools of sobriety and temperance. Their most famous dish was the black broth, the relish for which was found in a cold bath in the Eurotas. He provided abundant exercises, and such displays as induced both men and women to care for their health. Mitford emphasizes the fact, that he required the women to be specially trained, that their offspring might be vigorous: if they were not, they exposed them on Mount Taygetus. Education was publicly conducted, and aimed at endurance, courage, and strength. Plato declared, that those employed in the Spartan secret service "wander over the whole country by day and by night, and even in winter have not any shoes on their feet, and are without beds to lie upon, and have no one to attend them." Lycurgus, knowing that "a merry heart doeth good like a medicine," prescribed mirth for his people; and the Spartans were ever "famous for mirth, guided by wisdom."

Of the laws of the Athenians, as given by Solon, little is written; but Plutarch and Grote, as well as others, call attention to the fact that they reached all departments of private life, and regulated even the walks and feasts of the women. Says Curtius, "In the shady wrestling-grounds which spread themselves out in the neighborhood of the city, the young Athenians were to unfold the vigor of their bodies and their minds, and grow to be a part of the state, which demanded men not drilled in Spartan fashion, but fully and freely developed."

Grote remarks, that "Pythagoras appears as the revealer of a mode of life calculated to raise his disciples above the level of mankind, and to recommend them to the favor of the gods."

"The Pythagorean rule of life," observes Grote, "was distinguished by a multiplicity of abstinences in alimental and other physical circumstances of life, which were held to be of the most imperative force and necessity, so that offences against them were, of all, the most intolerable." Temperance was enjoined, exercise required, and superiority of mind and body sought. Their diet was chiefly vegetables, and so spare as to become proverbial. Juvenal intimates that a feast for a hundred Pythagoreans might be provided from a farmer's garden.

Hippocrates appeared as the special apostle of hygiene. He declared that men ought to study the nature of man, — what he is with reference to that which he eats and drinks, and to all his other occupations and habits, and to the consequent results from each. However cautious and feeble his medical practice, he urged attention to diet; and in his treatise concerning airs, waters, and places, enunciates great principles of public health. He speaks of medicine as an imitation of nature. He describes diseases as congenital or endemic, or as traceable to regimen, locality, or seasons. He says that he that would understand medicine must study winds, waters, and localities. He points out the relation of the health of a people to their environment.

Attention has been called to the fact, that, in the earliest times among the Grecks, a person's house was used as his place of sepulture. Later it was forbidden to bury within the walls, at least in Athens. At Megara and Tarentum the graves were in a particular part of the city. At Delos, from the time of Pisistratus, no graves were allowed in sight of the temple, and, after the sixth year of the Peloponnesian war, nowhere on the island.

From Plato's works it appears, that if any one intentionally polluted the water to be used by another, whether the water of a spring or of a reservoir, he would let the injured party bring the cause before the wardens of the city. He remarked, that, "when disease and intemperance multiply in a state, halls of justice and of medicine are always being opened." He would "feed the people on such provisions as are required by trained warriors, who are men of temperance and courage." Elsewhere he specifies, "They will feed on barley and wheat, kneading the flour and making noble puddings and loaves. These will be served up on a mat of reeds or clean leaves, themselves reclining the while upon beds of yew or myrtle boughs. . . . Of course they will have a relish, — salt and olives and cheese and onions and cabbages, and other country herbs which are fit for boiling; and we shall give them a dessert of figs and pulse and beans and myrtle-berries and beech-nuts, which they will roast at the fire, drinking in moderation." Thus he expected the people "to live in peace to a good old age, and bequeath a similar life to their children after them."

It is remarked that the daily bath was by no means so indispensable with the Greeks as with the Romans; but, as far as the bath was necessary to cleanli-

ness, its neglect was considered as a matter of reproach. We are told that the public baths were numerous in all Hellenic cities; and in the private dwellings of the better class a chamber was always set apart for the bath.

Physical training occupied a prominent place among the early notions of the Greeks. Plato held "there ought to be public teachers of gymnastics, receiving pay from the state; and their pupils should be the men and boys, and also the women and girls, who are to know all these things." In education, largely physical, he saw the continuation of the state: "For good nurture and education implanted good constitutions; and these good constitutions, having their roots in a good education, improved more and more."

Rome, even to day, in the *cloaca maxima*, or the great sewer, the remains of aqueducts and baths and other monuments, points to the early attention given to the subject of hygiene by the people of the imperial city. Lydell calls attention to the prohibition of burials in the city as early as 260 B.C. From Gibbon we have the affirmation, that "all quarters of the capital, and all the provinces of the empire, were filled with amphitheatres, theatres, temples, porticos, triumphal arches, baths, and aqueducts. All, whether designed for pleasure or utility, were variously conducive to the health of the meanest citizen."

Mommsen says, that "the bodily exercises of Roman youth advanced from ball-playing, running, and fencing to the more artistically developed Greek contests." Another writer observes, that "the daily bath, and, previous to it, strong exercise, were inseparable in the minds of the Romans from the idea of a regular, healthy life." The resources of architecture were brought into requisition in the erection of large buildings for baths. The ornamentations of art were added, and they became the places of amusement. Out of their ruins have been dug some of the priceless statues that adorn modern museums. The Pantheon was merely an entrance to the baths of Agrippa. The visitor is amazed at what remains of the baths of Caracalla, and of those of Diocletian, which alone contained thirty-two hundred marble seats. Even libraries were introduced, and lectures and disputations of philosophers.

It is possible that in the more ancient times the use of the cold-water bath was the prevailing one, and persons of simple habits of life adhered to this. "Perspiration and appetite, which earlier generations secured by corporeal exertions and agricultural labor, were attained by a later race by means of sutatoria and hot baths."

Strabo observes, "So plentiful is the supply of water from the aqueducts, that rivers may be said to flow through the city and sewers; and almost every house is furnished with water-pipes and copious fountains." Again he says, "The sewers, arched over with hewn stones, are large enough in some parts for a wagon loaded with hay to pass through." Another writer states, that "Agrippa, when he cleansed the sewers, passed through them in a boat." The Roman military system, in many points, shows an appreciation of sanitary principles. At one period we find the imperial city divided into four police districts. Among the sanitary duties of the police were the repair of drains,

public buildings, and places, proper cleansing and paving of the streets, the prevention of nuisances, the supply of the market of the capital with good and cheap grain, the destruction of unwholesome articles of food, and the oversight of baths and public houses. Cæsar proposed to reduce the malarial influences around the city by draining the Pontine marshes.

Pushing our inquiries for the relation of educational and sanitary considerations among the early Christians, we find that some of them were unfortunate in misapprehending the teachings of their great Master. He taught the subordination of the body to the high purposes of the soul, and enforced purity even to the very thoughts. His followers were to be living temples for his spiritual indwelling.

They were to withdraw from sinful practices and associations. They were to be temperate in all things. It would seem that here was the basis, as well as the highest motive, for a correct and complete system of sanitary doctrines in their application to the individual in all his relations as a member of the family or the church, or society or the state. Indeed, it is claimed that all high attainments of sanitary science and art in recent years among the nations leading in Christian civilization are in no small measure due to the precepts of Christianity. But, unfortunately, there were those who early, under the influence of misinterpretation, became ascetics, and would literally pluck out the right eye or cut off the right hand that offended.

Persecution favored their retirement to caves, and their separation from the usual and proper conditions of life. The night of the Dark Ages brought no adequate corrective. Indeed, amid their darkness, although Christian doctrine places cleanliness next to godliness, there appeared those calling themselves Christians, who "looked on personal dirt, like the old hermits of Thebaid, as a sign of sanctity."

A similar obscuration and perversion came over the doctrines and practices of education.

Bacon is often quoted as observing, that the past "ever deserves that men should stand upon it for a while to see which way they would go; but, when they have made up their minds, they should hesitate no longer, but proceed with cheerfulness." And I have thought it not unfit to recall so much of the distant past for the better understanding of the present condition of educational and sanitary relations to the considerations of which our subject now brings us.

The first centuries of the new era were preparing the way for the more recent triumphs of both education and sanitation.

Education, as a central and all-embracing agency in modern progress, employs all beneficial science and art, and comprehends all that belongs to man's right development.

For his rectitude, education enforces the precepts of morality; for his bodily and mental health, the precepts of sanitation. According to Sidney Smith's aphorism, "it is noble to seek truth, and it is beautiful to find it;" and, we may add, it is godlike to communicate it. Education must promote the seeking, finding, and dissemination of all truth, sanitation included.

Not until the chains were broken from education, and it was given full freedom to make use of all proper resources for man's culture, and to consider the adaptation of methods, subjects, exercises, and aims to the age, temperament, — in a word, to the nature and environment, — of the individual, could education itself appear in its true character and bring forth its proper fruit. In a sickly or feeble nature, or an unwholesome habitat, education seeks to produce the conditions of health. It declares to every one, in the language of Fuller, that "only in a strong and clean body can the soul do its message fitly." We can justly apply the words of Parkes, — both education and sanitation appeal to man's universal desire for life and freedom; they both "promote efforts for obtaining the most perfect action of body and mind during as long a period as it is consistent with the laws of life." In other words, education and sanitation unite in endeavoring to render growth more perfect, decay less rapid, life more vigorous, death more remote. They join in asking, in the language of the poet, "Who would not give a trifle to prevent what he would give a thousand worlds to cure?" Both appeal to the individual and the state for consideration and action on the principles of prevention. Only recently has hygiene been recognized as a science of great intrinsic value. Now physicians, engineers, architects, philanthropists, moralists, and teachers unite in studying to promote it. Statesmen recognize it as a legitimate subject for legislation and administration.

In this country, from the earliest time, here and there advanced and noble minds have indicated an appreciation of preventive medicine.

Dr. Toner points out to us the letters from John Clayton, printed in England, bearing date 1688, giving an account of his several observations in Virginia, in which he treats of the air, water, and soil, and indicates the sanitary effect of drainage, and the relation of certain diseases to atmospheric conditions. In South Carolina the records of legislation make mention of an Act to prevent the infection of the small-pox in Charleston in 1738; and in 1744 of an Act in general terms to prevent the spread of contagious and malignant distempers. But it should be remembered that the medical department of the University of Pennsylvania (our oldest school for the professional training of physicians) was not organized until 1765; that at King's, now Columbia, 1768; that at Harvard in 1782; that at Dartmouth in 1796; and that at Transylvania in the early years of this century. Our earliest instruction in medicine drew largely on Edinburgh for its inspiration, its doctrines, and its forms. All are familiar with the recent establishment of hospitals and asylums for the relief of either bodily or mental maladies. The medical profession are to be congratulated on the progress they have made in curative medicine, in spite of the opposition of superstition and ignorance. Humanity is their debtor. Not a few of us here will recall how, in our time, the public was shocked by the proposition to communicate beyond the limits of the medical profession the elements of anatomy, physiology, and hygiene. A great step was taken, some thirty years ago, when Cutter's works were admitted as text-books into the public schools and academies. Since then the attention, both popular and scientific, given to sanitation has increased in geometric ratio.

The true relation of government to public health can only be properly understood by an educated community. "It is not expected," says Dr. Jarvis, "that any action or power of government can directly cause a man to be healthy; but it can work as effectually for this as it can to make wheat grain, or an ox to become fat. The mind of man can imagine, and the hands of man can commit, hardly any crime which would not involve the violation of the principles of sanitation as well as the precepts of morality. The principles of hygiene are closely interwoven with the rights of person and property. On them rests very much of civil legislation and administration. Benjamin Rush said long ago, "I look for a time when our courts of law shall punish cities and villages for permitting any of the sources of bilious and malignant fevers to exist within their jurisdiction." The late English premier declares, "The health of the people is, in my opinion, the first duty of the statesman;" and Mr. Gladstone is credited with language hardly less emphatic.

Among us the acknowledgment of a governmental relation to sanitation has naturally followed the consideration given by the state to education, and, as we have seen, for similar reasons. True, laws have from time immemorial affected life and health; but here a more specific reference is made to that legislation and administration which specially aim at the prevention of disease, and which have resulted in the establishment of boards of health, so as to secure a correct knowledge of the sanitary condition of the people by systems of registration of births, marriages, deaths, and by sanitary inspection.

Twenty-two States, and a large number of cities, have organized boards of health. Their investigations have already reached conclusions of incalculable value to society. Their reports are among the most valuable public documents.

The interest these subjects have commanded in medical associations, social science associations, and this American Public Health Association, furnishes a notable sign of progress.

In the form of voluntary action this Association brings together the diverse sanitary influences of the country, and tends to harmonize them, and gathers and confirms local effort and organization. Its discussions and papers have done much to disseminate correct ideas of sanitation. Its influence has been specially prominent in devising some fit national action in the interests of public health. Its urgency, emphasized by the appalling destructiveness of the yellow fever, pointing out at once the value and inadequacy of all local effort, called in the comprehensive co-operative aid of the General Government; and we have the National Board of Health crowning all our other civil organizations for sanitary purposes.

This Board supplements the work of all the State and city boards by contributing to each information collected from all, as well as from the naval, military, consular, and revenue officers of the government, and from the medical and other experts among its correspondents. It also materially strengthens all local efforts to stay pestilence and preserve from disease.

Its single function of gathering and disseminating information cannot be duly

estimated. It is not creditable to us that there is deficiency or indifference in any portion of the country; but it is gratifying that sanitation is commanding an honorable place in literature, — in newspapers, books, and libraries. Already it has several periodicals devoted to its promotion. Specially notable are the series of health-primers, published in a style available to the largest number, treating such topics as "Our Homes," "The Mouth and Teeth," "The Throat and Voice," "Hearing, and how to keep it," "Long Life, and how to reach it," "Summer and its Diseases," "Winter and its Dangers," "Sea-Air and Sea-Bathing," "Preventable Diseases," "The Art of Nursing," "School and Industrial Hygiene."

After all, we cannot claim to be more than ready for a good start. Much has been accomplished if we are prepared as a people to see what we need, and to supply ourselves systematically and adequately. Sanitation, alike as a science and an art, must be nourished to its utmost vigor. It must bring under observation the facts illustrating every type and condition of soil, of climate, and of population, rural and urban. Escott remarks that there are three kinds of authority universal in England, — first, that relating to pauperism; second, concerning the highways; third, sanitary authority. And eminent authors, while showing the vast progress in securing sufficient and wholesome food and air, and better lodgings for the poor, and more healthy homes for the rich, affirm that the whole work of sanitation comes short of its full and complete results for want of better understanding and appreciation by the people generally.

Canon Kingsley, in a half-plaintive, half-poetic strain, entreatingly asks, "Why should not the experiment be tried of teaching the people something about the tissues of the body, their structure and uses, the circulation of the blood, respiration, chemical changes in the air respired, amount breathed, digestion, nature of food, absorption, secretion, structure of the nervous system? Why should not the art of keeping one's self alive and well be a part of technical education?"

Each commonwealth should not only have its State board of health, but local city, county, town, parish, or district board, according to its civil subdivision. Sanitarians, like educators, must believe in and affirm the righteousness of their cause. They alike must seek and accept all co-operative endeavors, whether public or private. There should be clear, definite, and mutual understanding. The friends of progressive sanitation, in urging the action of the State, must show that they seek not only what is right and legitimate, but what is expedient and promotive of personal and public welfare. It would seem that their arguments must prevail, even if driven to the lowest plane of reasoning. Dr. Farr, in taking an economic view of society, set down the minimum value of the population of the United Kingdom — men, women, and children — as upon an average not less than some £159 a head. No one can fail to see, that, as you increase the number of healthy persons, or diminish the days of sickness and the periods of dependence, you add so much to national wealth. Admit an epidemic or a plague that can only be kept out

by proper legislation and administration, and government action may be fairly held responsible for the pecuniary losses incurred. This class of facts must be accumulated and iterated and reiterated for the benefit of those who object to paying a slight tax for sanitary purposes. The legislation of the several States, and the decisions of the courts, leave no doubt that every child among us inherits the right to an education, the right to proper food, clothing, and shelter, and the necessary medical care when sick. Dr. Jarvis has shown that the strength of the State is the sum of all the effective people, deducting all the personal encumbrances, sicknesses, disabilities, and imperfections. From twenty to seventy is the period of maturity and efficiency. The labors of these fifty years create substance sufficient not only for the support of the worker of that time, but for the early years of youth, and also the ordinary period of decrepitude after seventy.

According to the precepts of political economy, man and nature are the partners in the production of wealth. Nature contributes the raw material; but man discovers, manipulates, and utilizes it, thus contributing a far greater element of value than nature. So far, therefore, as man's part is diminished by reducing the amount or efficiency of his activity, the result is correspondingly reduced.

The humane considerations in behalf of sanitation, as well as the beneficent results of sanitary efforts, should be steadily kept in view, and a knowledge of both universally disseminated.

What a confession was that of the English war-minister, that their first army in the Crimean war was lost by unsanitary conditions, and the second saved by the application of sanitary science, returning from those death-stricken regions in better health than it had ever been in barracks at home!

French military and colonial sanitation has a similar illustration. In Algeria three sets of troops had been decimated, and three sets of colonists swept away by disease; but by well-conducted sanitary work the conditions were altered, and a seat of health established in that settlement, the birth-rate rising above the death-rate. Children were robust and healthy, and the military force in as good condition as at home.

No less forcible are the illustrations brought from experience in connection with great epidemics. If it was true, as some have asserted, that the great fire of London was necessary to purify the city from the seeds of the great plague, modern sanitary applications have rendered such desolation no longer necessary. Professor Zidekauer, consulting physician to the Emperor of Russia, comparing the treatment of the cholera in St. Petersburg during its ravages in 1836, 1848, and 1855, with that in 1866, affirms that, in the first three attacks, from forty-seven thousand to fifty thousand were struck with the disease, of whom fifty per cent died. In the epidemic of 1866 from fifty-seven thousand to sixty thousand were affected with premonitory symptoms; but, under the improved treatment of advanced sanitation, only about five per cent died. All are familiar with the fact that, even among more favored conditions of society, there was, a century ago, an average life of thirty years' duration; while now

the average length of life in like circumstances is fifty years. Boards of health and sanitarians in our own country are year by year bringing about results which must fully vindicate the principles they advocate, — as, for instance, the reported reduction of the death-rate in Michigan; the reduction of the death-rate of infants in New York City; the general control of typhoid fever and scarlet fever; the limitation of the yellow fever in the last year of its recent terrible prevalence; and the success of the quarantine of New York City, the story of which reads like a romance. Nor should we forget manifold other results of their endeavors, — such as the improvement in tenement-houses; in the drainage of soils and sites productive of consumption and of malarial fevers; or the success with which they are enforcing upon architects the doctrine that, in the language of Bacon, "houses are built to live in, and not to look on: therefore let use be preferred before uniformity, except where both may be had." Not less should we forget what has been done for the regulation of abattoirs, and of systems of water-supply, drainage, and sewage; of market inspection, — interference with the sale of adulterated and other unwholesome foods. It is to be hoped that, by the aid of their sound sanitary counsels, the people of Memphis, by their good sense in future municipal administration, may rejoice that their city shall be known as the city of health, and not as the city of desolation.

Sanitarians may well consider what vast agencies for the promotion of health educational systems and institutions of education may be. Their purpose is to instruct and train every child in the land, not omitting any, whether blind, deaf and dumb, or feeble-minded, if not too weak to be instructed. A most intimate relation exists between sanitation and the administration of education. In boarding-schools the entire time and condition of the youth is under the teacher's direction, who should be too well informed to permit any fault. Rarely, however, does any considerable period elapse during which some one of these institutions is not invaded by disease, owing to sanitary neglect, or, worse, to sanitary criminality; and the facts and their lessons are withheld from others, lest the attendance in the future should be reduced. How terribly has one of our most excellent colleges been recently stricken, not because the president and faculty were not able and learned men, devoted to their work, or because they lacked skill in understanding all the conditions needful to the healthful culture of the promising young men committed to their care by trusting and devoted parents, but solely because the specific responsibility for the grounds and buildings did not enforce proper sanitary conditions.

Sanitary subjects should have a larger place in schools of medicine, engineering, and architecture, that all possible may be done to advance the qualifications of experts, and to keep their art and science up to the very advance-line of human acquisition. Dr. Bowditch affirmed in 1876, after a correspondence on public or private hygiene with sixty-two of our universities and colleges, exclusive of medical colleges, that (1) instruction in public hygiene and State preventive medicine is wofully neglected; (2) on private

hygiene only about one-third of the colleges give any instruction; (3) a full special course of instruction on either of the above themes is almost unknown; (4) but incidentally, in connection with some other not necessarily allied subjects, the topics are treated by about three-fourths of the colleges, while one-fourth of them do not even perform this small duty in this most important matter.

The attention given to the gymnasium and the physical condition of the students at Amherst by Professor Hitchcock, is hardly duplicated in this country.

Next to our medical schools, the universities and colleges for general culture should lead the educational advance in sanitation. In England already the universities of Oxford, Cambridge, and London are active. Much is expected of the new university of Victoria. Cambridge not having the legal right to grant a diploma, gives a certificate testifying to competent knowledge of what is required for the duties of a medical officer of health. The examination precedent requires (1) a knowledge of the principles of physics and chemistry, methods of analysis, and use of the microscope in ascertaining the condition of air and water, reference to ventilation, water-supply, drainage, construction of dwellings, disposal of sewage and refuse; and (2) a knowledge of the laws relating to public health, sanitary statistics, origin, propagation, pathology, and prevention of epidemic and infectious diseases, effects of overcrowding, vitiated air, impure water and bad or insufficient food, unhealthy occupations and the diseases to which they give rise, water-supply and drainage in reference to health, nuisances, and distribution of diseases.

This attention to sanitation in colleges, universities, and professional schools should assure among our people of culture, in whatever profession or occupation, a fair measure of sanitary knowledge, as had the learned classes in Judæa and Egypt. But all this will be comparatively in vain without instrumentalities for the universal dissemination of its facts, precepts, and benefits. Here especially does education enter into the most cordial relations with sanitation. Education alone has the men and women and instrumentalities by which this work of informing the people can be successfully and adequately prosecuted. Every parent may educate his child as he chooses. Institutions may be freely organized on private or religious or corporate bases; but, in order that none of the people may in any sense perish from lack of knowledge, every State and Territory, except Alaska, where there is no law, has a school system with an executive officer at its head. Each State and Territory has a school code, aiming to put a qualified teacher in every school; and, in control over teachers and schools, proper officers as directors, trustees, or superintendent, are brought into relation with the executive head for the State. On these systems of instruction over eighty million dollars are annually expended. The corps of school officers has never been enumerated. The supervisory and inspecting work is generally compensated; but the great number of this vast army of school officers, generally choice men in their several places, do their work without pay. Rarely can an honest-minded man perform these duties, and

not find himself growing to do his very best for the precious youth affected by his administration, and, as a consequence, laying aside prejudice, unfounded notions, and opinions not warranted in fact. He will not be indifferent to the conditions affecting health.

It must be put down to the credit of these officers that they have given American children, as a rule, houses for schools not elsewhere excelled; and they have sought steadily improvement in school architecture, and in the qualifications of teachers. But the public school officer may not merely promote instruction, or promulgate rules that should render the conditions healthful: his responsibility is fully met only when such conditions are beyond all question in agreement with the principles of sanitation. In addition to this, he has the power to determine how far subjects of hygiene shall be taught in the several departments and grades, and how far physical exercises promotive of health shall be introduced.

How often the young man or young woman comes through a particular course of training with the least possible knowledge of the simplest principles of hygiene as they apply to the person, the family, the school, or community!

On the theory of the friends of universal education there would be necessarily from one-fifth to one-third of the entire population under instruction at any given time during the school period. What a responsibility have school officers and teachers in the entire control of so much of the life during these formative years of our entire population! How sedulously should they consider the heating, lighting, and ventilation of the schools, and the seats and desks of the pupils, — in a word, all the influences at work! It must be confessed that there are school officers who hold their places in comparative ignorance of the principles of either education or sanitation. As a result, many schoolhouses have been erected, and many teachers certificated, without regard to fitness. Under their direction houses have been built with public money that have no proper provision for air, either in amount or quality. They have allowed schools to receive and communicate diphtheria, scarlet fever, small-pox. They have permitted unhealthy conditions to multiply around schools, until from them has gone sickness to desolate neighborhoods. They should be held responsible for all the unnecessary myopy, curved spines, and infection due to their ignorant or negligent administration.

Right principles of pedagogics will accord with right principles of hygiene. School supervision, which has been taking on scientific form among us for the last fifty years, — and has been worked with such incalculable effect to promote the universal instruction of our youth in intelligence and virtue, and the improvement of teachers, houses, and methods, — should be prepared and required to take special account of sanitation. Sometimes it may find essential the addition of the physician or sanitary engineer, or the woman trained in hygiene. As fast as science is admitted into the administration of human affairs, whether educational or sanitary, man's early life and school days will receive special attention. Diseases and other evils will be traced to their causes, and, as far as ascertained to be affected by or affecting school life, will be corrected.

The Bureau of Hygiene of the city of Brussels, Belgium, has just sent out a bulletin on infantile hygiene, pointing out that most of the infants who die are the victims of ignorance, routine, and prejudice. The office adds, "In order to diminish the considerable mortality which desolates and impoverishes at the same time the family and society, it is important to disseminate some elementary knowledge of infantile hygiene, so indispensable to mothers, whose solicitude must be relieved by the teachings of science and experience."

Recently a congress of school physicians was held in Berlin, endeavoring in its discussions to apply the principles of sanitation to the principles of pedagogics, and to determine how far the one should be modified by the other. The congress considered, first, whether it is best to cultivate mathematics and languages together or separately; second, whether there should be afternoon sessions of schools; third, how far pupils should participate in the work of their parents, what exercise should be taken after dinner, whether there should be any intellectual work after supper; fourth, what liberty should be given pupils in the selection of gymnastic exercises, and whether girls should use gymnastic exercises after ten; whether even the most talented and healthy pupils should be allowed to take particular lessons in addition to school work, and whether either the laws of health or of culture would permit pupils, during their school attendance, to participate in parties, balls, and like excitements.

In the recent International Educational Congress at Brussels fifteen papers on hygiene in schools were presented by specialists from Belgium, France, Great Britain, Hungary, Holland, Russia, and Switzerland. Still other papers were presented in substance. Long and earnest discussions followed, and certain declarations were made: as, for instance, (1) that class-rooms should be lighted on one side only, to the left of the scholars, and so arranged that all the seats should be fully and equally lighted; (2) that for lighting evening schools lamps were preferred; (3) that the size of a class-room for fifty pupils (the extreme number) should be about thirty feet by twenty-four and a half feet; that attention should be given to sanitation in school supervision and inspection.

In order to promote the statistical researches respecting the influence of schools on the physical development of children, they urged that the example of Belgium should be extended, and for this purpose advocated a system of international exchange of documents, and information relating to scholastic hygiene.

With regard to Kindergarten and infant schools they considered the importance of preventive medicine and care, and of attention to nourishment. They give utterance in reference to playgrounds, physical exercises, school fittings, and all that concerns the school that may affect the health of its pupils.

Indeed a very large number of investigators in this and other lands are now specially active in tracing all the relations of education to disease. We are shown how defective light or unsuitable positions may injure sight, how

myopy increases with study. Dr. Cohn investigates the size of letters, and their proper distance from the eye, and the proper distance of the printed page or the blackboard from the eye. Our attention is called to color-blindness. The students of insanity are making records for its prevention as well as its cure. The attempt is made to study scientifically the psychological development of mind from infancy to age in all conditions. Nor are these inquiries undertaken any too soon in view of the new problems of life suggested by such facts in our modern civilization as the dying out of families, and the increase of insanity.

A great step could be taken immediately by giving sanitation its proper position in our two hundred normal schools, with their fourteen hundred instructors, their forty-one thousand students, sending out annually their thousands of professionally trained teachers. The influence of such an effort would be greatly increased by giving sanitary subjects proper consideration in the hundreds of teachers' associations and the thousands of teachers' institutes held throughout the land.

It may be here remarked for the credit of schoolmasters, that, before boards of health existed, the American Institute of Instruction (1831) undertook to provide a plan for a village schoolhouse, giving the proper number of cubic and square feet for each occupant, and specifying proper means for ventilation. The next year they declared, that among the most prominent defects in the schools of our country was the want of spacious and convenient schoolhouses. Horace Mann added to his first report on education a supplement, in which he discussed, with his usual vigor, school architecture.

The United States Bureau of Education, during the last ten years, has published articles, chiefly original, on the condition of medical education, past and present; on schoolroom diseases; on the relation of education to insanity; on the vital statistics of college graduates; on vital statistics derived from the Federal census reports from 1800 to 1860; on free rural sanitaria for the poor in summer; and on vacation colonies for sickly school-children, — by Drs. Nathan S. Davis, J. M. Toner, Edward Jarvis, Charles Warren, and Professor Virchow. The bureau in its annual reports has always paid some attention to school hygiene. It has collected information respecting hospitals and boards of health, for which it has been thanked by the American Medical Association. It has always advocated the establishment and cordial support of State and city boards of health. It has published special pamphlets recently respecting schools of nursing, schools of cookery, and rural school architecture, and stands ready now and hereafter to aid in every proper way the direction of the public intelligence to the conservation and increase of public hygiene.

Bring up to a proper standard the information, the theory, and practice of those who direct our public schools; advance the three hundred thousand teachers of the land to the full discharge of their duty with respect to sanitation in the teaching and training of our youth, and they would create public sentiment that would leave no excuse for the shortcomings of sanitary experts, either in the breadth or accuracy of their researches and inferences, or the

efficiency of their administration. There would be no longer a lack of a satisfactory system of registration of marriages, births, and deaths, in any State or Territory. Physicians would not fail to make sufficient record and report of diseases. The community would not fail for opportunities to know as accurately and fully as need be the usual or special causes operating to prevent disease, either mental or bodily. Business and professional men would be warned against the methods and business hours that hasten sickness or bring on decay and death; apparatus and systems of heating, lighting, and ventilating, so often fostering disease, would be banished from homes, churches, schools, and places of pleasure or labor. The dust, heat, effluvia, or other conditions so often destructive of life in certain mechanical industries, would be reduced to the minimum of evil, and all possible remedies applied. Gradually there would disappear alike from city and country these regions of filth, over the entrance to which all who approach might fitly read, as Dante read on the infernal gate, "All hope abandon, ye who enter here!" There would be sought out and removed those sources of disease that conceal themselves in cleanly appearance, but send out the fatal diphtheria or fever. The communication of contagion by commerce or travel or social intercourse would be understood and prevented.

I need not pause to show intelligent religionists or moralists, that, as sanitation is advanced by educational aids towards its proper position, their assaults on vice and crime will be enforced by arguments drawn from mental and physical health or disease. "Sanitation points to the rum-shop and brothel as the place for the generation and dissemination of contagion. It shows that an ill-drained, overcrowded residence may generate disease, and intensify tendencies to scrofula and phthisis;" and morally, adds Dr. Fraser, "modesty must be unknown, and decency out of the question."

The public mind in quarters is greatly agitated about the sphere and condition of woman. In all matters of health no one will question her equal interest with man. Not a few of her own sex in our country have become alarmed at the increase of various forms of nervousness, and the multiplication of sickness. Here, therefore, is an unquestioned sphere for the exertions of woman. At the recent Sanitary Congress at Exeter, speaking of woman as a sanitary reformer, Dr. Richardson, felicitously citing Solomon's description of a good wife, "who worketh willingly with her hands," said, "She is an early riser, and sees that every one has an early breakfast. She knows that where there is poverty there can be neither health nor happiness. She is watchful and busy. 'She looketh well to the ways of her household, and eateth not the bread of idleness.'" He also called to his aid Xenophon's dialogue treating of the household and its economies, in which Socrates and Critobulus are made to concur that the ordering of a household should properly be named a science, in which Socrates speaks of a certain man called "the Good," who affirms that while performing his duties as a citizen he could safely be absent, for his wife, whom he had instructed, could order well enough what was wanted there. Dr. Richardson declares that sanitary science must have its true birth

in the home. The man is abroad; disease threatens the home, and the woman is on the spot. He would give woman that training by which she shall be enabled to direct domestic life, that she may exert all her influence for the prevention of disease. He believes this training is simple and practicable. She must be taught the laws of lighting, heating, and ventilating the house, the nature and effect of food, the chemistry of the kitchen, the art of cookery. She must understand and resist those mistakes of marriage which promote disease; she must comprehend the child and its training; she must master domestic economy, and be an educated nurse.

Need I add, that the proper — or, if you please, the ideal — union of education and sanitation would not be expected to annihilate pain or disease or death, but to reduce them to their minimum? The physician would practise preventive as well as curative medicine. His directions would be more intelligently followed, and his labor more cordially rewarded. The approach of a new or modified disease or great epidemic would be at once known and speedily antagonized by all the resources at the command of the nation, the state, the city, the family, the individual.

I close by asking you, eminent experts in sanitation, and you, intelligent citizens of this great mart, to which the waters of the Mississippi and its tributaries bring the vast trade of their broad and fertile valleys, if education and sanitation were so united as to increase continually the intelligence, the health, and the safety of our communities, what could add so surely and so swiftly to the prosperity of every business in which you toil, and the success of every object to which men aspire?

XXIII.

THE VALUE OF SANITATION FROM AN ECONOMIC STANDPOINT.

By J. M. KEATING
Of Memphis, Tenn.

I.

About this time, as the almanacs predict of the weather, or the astrologists of catastrophes and cataclysms, look out for much advertising of great increase of population by States and cities anxious to measure their importance by the scale of beings. Newspapers and periodicals are just now vexing the public mind with comparative tables setting forth "immense" and "unparalleled" growth, and with very comforting computations of the money value of the average immigrant, and the total of gains in a given decade. States and cities take precedence according to population: hence the eagerness to excel, and the almost indecent and indecorous arguments with which one contends with the other, until at last the question of ascendancy is decided by the Federal census. Long essays from enthusiastic patriots find their way into the reviews; and elaborately prepared official reports are sent out by States, setting forth the acquisitions of population, and inviting immigrants by carefully prepared statements of advantages in climate, soil, and productions, and facilities for reaching a market, — many States going so far as to maintain expensive embassies at New York, and some in Europe, for the purpose of inducing immigration, and thus securing a rapid increase in population, whose industries will increase the wealth of the State, and lighten the burden of taxation. This is good policy. Its results are seen in the rapidly augmented wealth, as well as population, of the country. Since 1830, when the total of the inhabitants of the United States numbered only 12,866,620, fully 12,000,000 immigrants of all ages and both sexes have found homes in this country, and helped to create and build up powerful and populous States. These, according to the carefully prepared averages of "The London Economist," were worth, — the men $1,600 each, and the women $1,250, — say, $1,000 each for men, women, and children; making the enormous total of $12,000,000,000 added to the wealth of the country in fifty years without any outlay of capital. But this is only the capitalized value of the human machine. We have in addition the net annual profit of the earnings of each individual, averaging twenty per cent of $650, or $130 each, — a grand total that has gone on swelling in volume from year to year, until to-day it

is represented by the $50,000,000,000 worth of real and personal estate, the aggregate of all that is returned by the States and Territories of the Union. How rapid has been the growth of this vast sum, and how much of it is due to the annual augmentation of population by immigration, may be realized from the fact that in 1850 the total real and personal wealth of the country was only $7,135,780,228; and in 1860, when the great upheaval and quickening took place, it was only $19,089,156,289, including over $2,000,000,000 worth of slave property swept away by the civil war. Another proof of this growth is supplied by the fact that in 1850 there were only 8,589 miles of railroad in the country; in 1860, 30,793, — whereas there are now 100,000 miles competing with a river, ocean, and lake transportation, the growth of which has kept pace with that of the country. During this year (1880) alone it is computed that fully 500,000 immigrants will find homes in the different States and Territories, increasing their productive capital by $500,000,000, and the annual net profits of all descriptions of labor by $65,000,000. Making place for immigrants pays. Would it not pay quite as well if a sum equal to one-hundredth part of the money that is expended to secure them was appropriated to preserve the health and lives of the existing population, and protect the people of the manufacturing and commercial centres from the effects of the yearly increasing list of decimating preventable diseases? Aside from the humanity involved, would it not be well, on the score of economy, to enforce carefully prepared laws and ordinances for the preservation, not only of the health and life of the immigrant and his offspring, but of the native population as well, increasing the average for both, and thus, by gains of years, or even months, increase the amount and the net earnings of the labor of the whole country? If every industrious immigrant is a gain to a State, would not every month of increase of the average of human life also be a gain? And yet, the value of the individual industrial life admitted, but few States have taken any certain steps to increase the average duration of it, or protect the people against the sorrow, loss, and misery consequent upon the perpetuation of preventable diseases, almost wholly the result of unsanitary conditions growing out of the crowding of human beings in hamlets, villages, towns, and cities, in defiance of all the laws of health. Malthus has now but few disciples, and no followers to speak of. We know that population is wealth. We are eager to secure it; but we are reckless of it, and indifferent to its safety. When we have it, we are sure to make a big show and a great brag by figures. We acknowledge its potency, and the magical results of its power for the building-up of States and the increase of wealth; but we are as prodigal of it as if Europe was a breeding-farm whence we might stock the national domain at will. We are plethoric of promise, but chary of performance. The ward politician revels in mud, and the greatest of our statesmen walking on stilts cannot condescend to the public health. No party platform has ever yet said any thing about it. "Life, liberty, and the pursuit of happiness," are the words of the guaranty of the Declaration of Independence. Without health life is a burden, happiness impossible, and

liberty a myth. Guaranteeing these things, it would seem as if the first duty of the State should be the preservation of the public health, — to prevent the recurrence, propagation, and spread of epidemic diseases, and guard the citizen, not only from attacks by criminals or foreign States, but against the encroachments of that army of many corps which as surely brings death and desolation in its train as any ever organized for conquest. We police the territories to save the settlers from the depredating Indians, our cities to prevent attacks by the housebreaker and midnight marauder, and the country to save the farmer from the tramp. We have firemen to save our property from the flames; but we have not, save in Massachusetts, a thoroughly organized safeguard for the public health. Ignorance and selfishness pollute the soil, indifferent alike to the warnings of the sanitarian and the lessons of the past. The inhabitants of our villages, towns, and cities, saturate their limits with their waste, and even in death continue to poison the earth. Polluted air and water is the consequence, and fearful decimating epidemics the result. New York suffers every summer from an epidemic produced in this way, that makes it a very graveyard for children under five years of age. How absurd to continue the call for immigrants, and rejoice over our increase, when, in that city alone, 4,215 children under five years die in the three months of summer of each year; where the annual death-rate of the little ones under that age is 110 per 1,000; where, for a time during the past summer, the highest mortality rate of any city in the world which reported its deaths was reached; where, for example, the rate during the week ending July 3, 1880, was 56.20 per 1,000 of all ages, — a result attributed by the best authorities to the dense accumulation of people in badly constructed tenement-houses, and to the miles of festering filth exposed in its streets to the summer sun! How hollow are our pretensions and promises to the immigrant beside the fact that in Cincinnati and Cleveland the deaths of children under five years are reported at 50 per 1,000, that in Boston they average 46 per 1,000, and that in Chicago they are quite as many as are reported by New York! Two-thirds of the deaths reported by Chicago in the summer months are of children under five years; and it is computed by a careful statistician and observer, that one out of every ten infants perishes every summer as a result of unsanitary conditions, — foul air, unwholesome food, and personal uncleanliness.

II.

The general condition of the masses is the best criterion of national progress or decay. In nearly all our large cities we but repeat, so far as sanitary regulations are concerned, the conditions out of which the people of Europe, with the aid of sanitary scientists and experts, have been endeavoring to lift themselves ever since Florence Nightingale, in 1856, inaugurated sanitary reform. What these conditions result in will be seen in the fact, that, during the cholera epidemic of 1849 in London, among the higher classes only 26 per 1,000 died, while in the middle classes 157 per 1,000 died, and among

the laboring classes 817 per 1,000 died; the appalling difference being mainly due to overcrowding in illy ventilated and badly constructed tenement-houses, standing on a soil polluted by a stream of excrement pouring steadily in deadly and augmented current through many hundred years. In a minor, but still striking, degree, the colored race in our Southern cities is furnishing another illustration of the results of ignorant violation of the primary laws of healthful living. The excess of the colored death-rate over that of the white population will average fully $33\frac{1}{3}$ per cent. In Memphis, while the death-rate for the total population during the summer months of 1880 was 32.5 per 1,000, it was 26.6 per 1,000 of white population, as against 38.5 per 1,000 of colored, an excess of plus 44 per cent; and the annual death-rate of the whites is now 22.8, as against 35.7 for the colored, an excess of plus 52 per cent. The ever-raging battle for life is intensified by the imbruting, despair-producing, unsanitary conditions under which the poor in cities labor. Baron Kolb, in the instructive statistics which he has recently published in Belgium, proves this by testimony, showing that, even among that thrifty, plodding, and prudent people, the average length of life of the well-to-do is fifty years, and of the poor thirty-two years. Close application, insufficient food, poor clothing, comfortless lodgings, aggravated by foul air and bad water, make the differences. Death is steadily thinning the ranks of the industrial poor, and robbing the nations of wealth that might be saved by the strict enforcement of sanitary laws. In the presence of the incomprehensible and mysterious cholera and yellow fever, which are to all other diseases of similar types as the hurricane to the gentle zephyrs, we forget the destruction that is going on every day, and that at the end of each year numbers its victims by thousands. At the advent of either of these diseases, there is wide-spread alarm, suspension of business intercourse, and the establishment of shot-gun quarantines; all industry is paralyzed, whole communities become pauperized, trade is diverted, and losses are individually entailed such only as a state of war could parallel, while the hundred-fold greater mortality by other diseases creates no alarm. For instance, in 1873, the total of deaths from both cholera and yellow fever throughout the country was 8,000 in a total mortality of more than 500,000. From the date of the first case of yellow fever (May 23) to the date of the last (Dec. 23), there occurred 3,397 deaths from specific or epidemic yellow fever; whereas, during the same period of each year, there occurred from the group of malarial fevers an aggregate of 9,200 deaths. Again, from the subsidence of the preceding epidemic in 1867 to the close of 1872, there were 970 deaths from yellow fever while, during the same period, there had been an aggregate of over 50,000 deaths from malarial fevers. Cholera furnishes comparisons equally effective for our purpose. From the 9th of February to the 16th of October of 1873 (the dates of the first and last cases of that disease in epidemic form), there occurred 3,825 deaths. During the same period each year, there occur, in round numbers, 20,000 deaths from diarrhœa, dysentery, and cholera infantum. There had been no epidemic cholera for the six years previously; but, during that period, the group of

diseases most resembling it carried off not less than 125,000 persons. But, beside these, there are such preventable diseases as small-pox, meningitis, diphtheria, scarlet fever, measles, typhus, enteric fever, and consumption, carrying off their constant average of over 100,000 annually. From all these agencies of death there is but one avenue of escape, through sanitation, — personal cleanliness, pure air, unpolluted water, and wholesome food; an untainted soil, perfect sewerage and drainage; daily scavenging, and the same energetic and persevering daily cleaning-up of city highways and byways as characterizes the best managed households.

III.

What we lose by the neglect of sanitation we may form an approximate idea of from the figures furnished by the statistics of yellow-fever epidemics. In 1804 the number of deaths from yellow fever in Spain are officially reported to have been 124,000, a loss of $124,000,000, averaging each person as equal to $1,000 capital. The same statement says that the population of Spain was reduced 1,000,000 by flight and death, a loss of $1,000,000,000 in one year to the capitalized energy and productive industry of the country. According to the English Board of Health, there occur in England 120,000 deaths annually from preventable diseases, and 1,200,000 cases of preventable serious sickness; the failure to prevent which by thorough sanitation costs England annually a direct loss of $96,000,000, while the interest on her public debt is only $84,000,000. The commission appointed at the instance of Congress to investigate and report upon the causes and money-losses by the epidemic of 1878, stated the cost of nursing and medical attendance for 125,000 sick, for the funerals of 18,000 dead, and special sanitary work done, to be $5,560,000. New Orleans put her total losses during that year at $15,335,000, while they were perhaps nearer $25,000,000. This embraced the cost of nursing, medical attendance of 27,000 sick, funerals of 4,600 dead, money-value of same number of dead, loss of time of the industrial population, loss by refugees abroad, losses by rents, depreciation of real estate and interest on capital, and the local commercial losses by interruption of business and diversion of trade. The losses of Memphis during the same period for medical attendance and nursing 17,600 sick, and the funerals of 5,150 dead, diversion of trade and expenses of 20,000 refugees, and maintenance of those who remained, were fully as much as $15,000,000. The losses of life to Memphis by yellow fever from 1867 to 1879 were fully 10,000 persons, the capitalized value of which, at $1,000, amounted to $10,000,000. If we add to this, $2,500,000 for funeral expenses and attendance upon 30,000 sick, and $30,000,000 for suspension of industry, diversion of trade, and the expenses of refugees abroad, we have a total loss in the twelve years of $37,500,000, a sum, large as it is, that is under rather than over the mark.[1] In 1867 the population of the city was, by muni-

[1] By the fever epidemics of 1867, 1873, 1878, and 1879, fully twelve months (the best in a business point of the year, — September, October, and November) were lost, and the average annual trade of the city is $65,000,000. It is therefore safe to make this statement.

cipal census, 45,000; in 1870, by United States census, 40,226; in 1880, by United States census, it is only 34,000, showing an actual loss of 5,226; and, if we add the natural percentage of increase (say 30 per cent, or 12,000), we have a total loss of 17,226, representing a loss of productive capital amounting to $17,226,000. It is not too much to claim that the total loss to the immense extent of country assailed by yellow fever in 1878 (from the mouth of the Ohio to the Gulf of Mexico, extending back on the east side of the Mississippi for an average distance of one hundred miles) was fully $200,000,000, a sum nearly equal to the annual expenditures of the United States Government for all purposes, including interest payment, which, in 1877, was $238,000,000; a total that, if levied in one year as an addition to existing public burdens, would create a revolution, and endanger the stability of our government; a sum nearly equal to the total of our annual exports of cotton, and nearly equal to one-third of the total of all our annual exports. The preventive against this loss of life, of skilled labor, productive industry, slowly accreted capital, with its assured interest of twenty per cent (five times greater than the best securities of our National Government can bring), — the preventive against this steady drain is to be found in a system of quarantine uniformly enforced by a National Board of Health co-operating with State and city boards, and by a system of local sanitation constantly and energetically enforced. For disinfection we have nothing to say. Better than disinfectants is sanitation. It is the ounce of prevention. Ships properly policed cannot be the vehicles of yellow fever or cholera poison. Make knowledge of sanitation part of the curriculum of every man who aspires to command a ship, and quarantine will soon be unnecessary.

IV.

It is useless to lock the stable after the horse has gone. Dr. Holt of New Orleans says, "The whole question of the necessity for sanitary reform may be reduced to the following summary: While we cannot demonstrate a direct causative relation between the filth of a city, town, or ship, and the first appearance of yellow fever, the disease invariably develops itself *primarily* associated with a bad sanitary condition of the community. In certain cities formerly devastated by the pestilence, the scourge has ceased coincidentally with an improved sanitary system," — just as typhus formerly prevailed, both in this country and in England, until its direct relation to certain forms of filth and other vicious hygienic conditions pointed out the remedy; and now, as recently noted in the "Bulletin of the National Board of Health," it is so rare as to give no appreciable death-rate for the whole population. In Spain, where hygiene and sanitary science are comparatively unknown, there were, even so late as June of this year, 479 deaths from this typical filth disease in a single month. To obvious and wide-spread unsanitary conditions in Memphis was due the high death-rate of that city, — a death-rate which Dr. F. W. Reilly, of the National Board of Health, has shown to average 35 in the 1,000, even during the non-epidemic years. Of the total number of deaths (exclusive of

those from yellow fever) during the five years ending Dec. 31, 1879, he has shown that over 15 per cent was due to phthisis, pneumonia, and other diseases of the lungs, the excess being fairly attributable to defective sub-ventilation of dwellings, and to an undrained, retentive soil. Excremental and malarial diseases caused nearly 57 per cent of the total; and this excess may be set down as due, in great measure, to soil and water pollution. Dr. G. B. Thornton, president of the Memphis Board of Health, in his report for 1879, thinks that "the re-appearance of yellow fever in July, 1879, under the circumstances, demonstrated the possibility of the disease holding over from one summer to another, and proves very clearly that we cannot rely with certainty upon the low temperature of our winters exclusively to eradicate the poison when it has once become fixed upon us as it did in 1878. Therefore the demand for thorough local sanitation in every respect is imperative, and will admit of no temporizing policy." Mr. John Simon, in his report in 1874 to the Privy Council of England (of which he is medical officer), says, "It has been among the oldest and most universal of medical experiences, that populations living amid filth, and within direct reach of its polluting influences, succumb to various diseases, which, under opposite conditions, are comparatively or absolutely unknown; and the broad knowledge that filth makes disease is amply represented in the oldest records which exist of legislation meant for masses of mankind. The exacter studies of modern times have shown, that, by various channels of indirect and clandestine influence, filth can operate far more subtly, and also far more widely and more destructively, than our forefathers conjectured. . . . Of all the filth influences which prevail against human life in this country, privies of the accumulative sort operate undoubtedly to far the largest extent." "He who cures diseases may be the skilfulest, but he that prevents is the safest, physician," says Fuller. The saving of life, and the prolonging of it by the prevention of disease, should be among the first duties of the State. This can very largely be accomplished by sanitary precautions that will save people everywhere from preventable or filth diseases. To fail in this is to incur as grave a responsibility as that which attaches to the government that causelessly makes war, and needlessly brings death to the door of the masses, and general disturbance to the industries of a nation. Sanitary associations have done, and are doing, a great deal to correct vile and filthy habits, personal and collective; but the law, — the strong hand of the law, — operating through intelligent, energetic, firm, and skilful sanitarians, must everywhere be invoked. So necessary to health and life, the enforcement of sanitation should not be left to chance, or the soft and gentle entreaties of the *dilettanti*. Neither appeals from the pulpit, the rostrum, the pamphlet, nor by "address," should be allowed to usurp the place of law. Unless they are forced by law, the people will not, by sanitary operations, do their part to prevent disease. The private premises or the city that is in an unsanitary and filthy condition is as dangerous as a magazine connected with a slow match. It is only a question of time and conditions when it will explode, carrying death and destruction in all directions. Towns and cities,

when not properly policed, when covered with filth on the surface, and standing on a soil reeking with pollution, become the breeding-places of disease and death. They become a nuisance, to be abated, if in no other way, by national law. As Vezin says, "No one would be permitted to recover the value of a wild beast, or of a mad dog that endangered human lives, in case an animal were killed. With as little consideration as to the cost to the filthy citizen or community, the nuisance resulting from his or their neglect or indifference to sanitary laws should be abated." It is a case of life and death, that brooks of no delay.

V.

Of the value of sanitation there is no room to doubt, although as a science it is yet but little understood, scarcely at all by the masses. A report to the Privy Council of England states, that in thirteen of the principal towns of that kingdom the average death-rate per 1,000 of the inhabitants, before the introduction of sewers, was 28.4 in 1,000; and that, since the introduction of sewers, it was but 23.4 per 1,000, being a decrease of 17.5 per cent. In the past ten years the death-rate of London has fallen from 24.4 per 1,000 to 22.8 per 1,000. And yet Mr. Rawlinson, the eminent engineer, in a public address delivered at Exeter Hall not long since, declared that the sewers of the official residences of Downing Street were death-dealing traps; that Somerset House was indescribably foul; that the War Office was fouler than any common beggar's lodging-house; and that Belgravia, the centre of the culture and intelligence of the metropolis of England, — indeed, of the civilized world, — was the worst part of a city on which money and science have been lavished to make it clean and healthful. If this is the condition of the official palaces of the government and the homes of the higher classes of England, what must still be that of the homes of the working classes and the very poor? Men learn very slowly and by painful tutelage. It is only when epidemic diseases, rightly called "God's protest against filth," makes its appearance, that they can be stopped in their headlong career of gain or pleasure long enough to hear — even to hear — the simplest maxims of public health. For a thousand years, says Professor Lyon Playfair, personal cleanliness was so universally disregarded that scarce a man, woman, or child throughout Europe made a practice of daily ablution. During this carnival of filth, again and again the "black death" ravaged European countries. In the reign of Justinian, as Gibbon records, a large proportion of the human race was swept away by an epidemic, which, with but slight intermissions, raged for fifty years. In Constantinople a thousand gravediggers in constant employ could not hide away fast enough the victims of this dreadful disorder. We have all been made acquainted, through the ghastly pictures drawn by Boccaccio, with the fearful plague that desolated Florence in the fourteenth century, and by Defoe with the ravages of the "great plague" in London. The gross licentiousness of the Spanish discoverers of the sixteenth century inoculated Europe with a venereal virus that scandalized the Church, appalled legislators, and at one

time threatened to destroy the public health of almost every European State. The terrible effects of the yellow-fever epidemics of the past ten years in this country are still a painful memory to millions of survivors. There can be no doubt that to the extraordinary sanitary measures adopted by New Orleans and Memphis, and to the sleepless vigilance of the agents of the National Board of Health, the people of the Mississippi Valley owe their exemption from a recurrence of it in 1880. Co-operating with that Board, those of the towns and States along the Mississippi River were energetic and in perfect accord. A continuation of the Board, with ample means and enlarged powers, and we may hope not only for escape from cholera and yellow fever, but for a continuance of the blessing of public health throughout all the lower valley. The murder, by bad quarters and insufficient clothing and food, of six times the number of British soldiers killed in action, in the Crimea, together with the efforts of Miss Nightingale in the hospitals at Scutari, gave an impetus to sanitation in England, indeed throughout Europe, just as the yellow-fever epidemic of 1878 did in this country.

VI.

Since 1856, when sanitation first found a place in public economy, the progress has been gratifying; but much remains to be done. We are but on the threshold of great results. Let us look at some statistics furnished by Dr. Bryden of India in his last report to the British Government. He states, that, as a result of the rigid enforcement of sanitary laws under intelligent and energetic medical officers, the death-rate among the troops in India has been reduced from 69 in 1860 to 17.62 per 1,000 per year in 1880, and in Europe from 17.9 in 1860 to 8.56 in 1880 per 1,000 per year. No field can afford the same scope for observation and work by the sanitarians as India does, save our own country. As recently as 1850 it was considered a very graveyard for Europeans. Young men entered the civil or military service there as a last hope when their fortunes were straitened, or in the sheer desperation that impels men sometimes to put behind them every other consideration but that of advancement. The history of the English in India is a melancholy record of "battle, murder, and sudden death." Cholera in a form a thousand-fold more venomous than has ever been known in Europe or America, jungle fever, and typhoids were the extremes in between which were others of less malignancy, but in the end no less fatal diseases, that either killed or slowly sapped the foundations of the most vigorous constitutions, making wrecks of men who, under the ordinary conditions of life among the middle classes of England, might live to enjoy a hearty old age. This is no longer the case. The sanitarian has been at work, and a great change for the better has resulted. From 1861 to 1865 the death-rate among the European troops was 9.02 per 1,000; from 1876 to 1877 it had been reduced to .84 per 1,000. During the cholera epidemic of 1876 (the famine year) the death-rate among the Indian population was as high as 12.12 per 1,000; that of the European troops was 1.85, and the native troops 2.2 per 1,000. But this advance in life and decrease of

the death-rate by a disease that at one time was held to be beyond the power of medical skill to deal with or sanitation to mitigate and prevent, — this is not all that has been accomplished by the sanitarian of India. The death-rate from that greatest scourge of India — fever — has also been largely reduced. During the nine years from 1859 to 1867 the mean of mortality was 22.41 per 1,000. In the nine following years, from 1868 to 1876, it was only 3.29 per 1,000; and in 1876 as low as 1.26 per 1,000. Sir Joseph Fayrer, president of the Epidemiological Society, commenting on these facts, claims that they are wholly the result of sanitary work, and are not due to treatment, in which but little advance has been made. Experience has taught the people of India that local causes have a potent influence upon diseases; that cleanliness, good air, pure water, and free ventilation are all-powerful opponents to cholera, and that it is not to be controlled by sanitary cordons. The result has been a vast saving of life, and a vast saving of wealth, of money, and of labor. Coming nearer home, we find that in Manchester, Eng., the death-rate the past seven years has been 3 per 1,000 less than for the previous seven, and in Liverpool 6 per 1,000 less. The introduction of pure water to Glasgow, from Loch Katrine, reduced the number of deaths from cholera in that city surprisingly. In the three epidemics preceding 1859 — the date of disuse of the polluted water of the Clyde — between 3,000 and 4,000 people died, whereas only 68 have since died from it. The average annual saving of children's lives in England since 1860 is set down at over 10,000, the result of purer air, better water, more intelligent care, better clothing, food, and housing. Dr. Kelly of King's College, London, states that the death-rate in continued fevers in England has been greatly reduced. In 1865 it was as high as 1,100 per 1,000,000 persons living, whereas it is now but 400. The immense reduction in the number of deaths by small-pox, he claims, affords a typical example of the benefits of preventive medicine. During the past twenty-five years there has been a compulsory vaccination: the result is a reduction of the death-rate to 216 per 1,000,000 persons living, or about one-fourteenth the rate of the last century. An equally well-enforced, compulsory, general sanitary law would, no doubt, produce like effects with other diseases. In the prisons of England even better results have followed upon thorough sanitation.

VII.

There is good reason to believe, that, as has been said above, sanitation is effective in restraining, if not preventing, a recurrence of the yellow fever, at least in mitigating its effects. Dr. Southwood Smith of the London fever-hospital urgently recommends sanitary work as the only means of protection against yellow fever. Writing in 1829, one of the royal commissioners to investigate the causes of yellow fever in the West Indies, declared it to be the result of a poison formed by the corruption or decomposition of organic matter, — of vegetable and animal substances. This has been generally accepted by the profession, which, accordingly, has not only advised, but urged sanitation, even when it has not agreed upon the efficacy of quarantine. "Hence

prevention," says the homœopathist, "is the great desideratum. Aggregation of human beings is one of the factors of yellow fever." The Medical Society of Shelby County, Tenn., composed of gentlemen who have had experience in one or more epidemics, was unanimous in advising sanitation as the only remedial measure, the only preventive of epidemic yellow fever. By effective sanitation Jackson, Mississippi, Mobile, Galveston, Charleston, and Savannah escaped in 1878 and 1879; and New Orleans, we know, furnished last year an example that is almost conclusive evidence of the sufficiency of thorough sanitation as a preventive of epidemic yellow fever. Georgia, having lost $5,862,357 by the epidemic of yellow fever that prevailed in Savannah in 1876, has been prosecuting sanitary work there ever since, in part at the expense of the State, swamp-drainage engaging a large share of the attention of the commissioners. New Orleans is also continuing, though too slowly, the work that saved her in 1879. Quarantinists and anti-quarantinists, contagionists and anti-contagionists, all favor sanitation as a means of mitigating, if not preventing, yellow fever. Physicians of experience and extended observation, now and in the past, have held and do hold, that, if not a preventable disease, it is one that, like typhoid fever, ship fever, scarlet fever, measles, small-pox, diphtheria, pneumonia, meningitis, and typhus, can be limited in its destruction of human life, and may be held in check as the fevers of India and the cholera are now in that country. So it is held to be in Memphis, and with good reason. In the winter of 1879 a house-to-house inspection was made in that city by a commission of experts of the National Board of Health, the result of which was a report setting forth, that, "of the 7,202 buildings within the city limits, 1,453 were built so close to the ground as to have no air-space beneath the floor, 2,030 had insufficient or obstructed subventilation, and only 2,204 (about two-fifths of the total number) comply with the proper requirements in this respect. There are 1,515 buildings with cellars and basements: and, of these, 786, or half, are badly ventilated, damp, wet, many with water standing from two to eighteen inches deep on the floors, and with walls soaked by sipage from the surrounding polluted soil; 494 buildings and groups of structures have been recommended for destruction, or for vacation pending alterations necessary to fit them for occupancy.[1] Of the 6,000 sub-surface privy-vaults in use, varying in depth from a few inches to forty feet, less than one-third were healthfully remote from living-rooms; the rest were at all degrees of proximity, even in the cellar in many cases. Of the 4,744 cisterns and wells that furnish the larger share of the water consumed, 3,408 were found within contaminating distance of privy-vaults. A result of this unsanitary condition is the high death-rate that has hitherto prevailed, which, in 1875, by the local authorities, is set down at 29.77; 1876, 24.78; 1877, 20.06, on a basis of population of 40,000. By the National Board of Health the death-rate is stated, from actual data furnished by the city Board of Health, to average thirty-five per thousand for those years, on a basis of

[1] These include not only many cheap, almost worthless, one-story shanties, with one or two rooms, but some brick business blocks, hotels, and public buildings.

population of 35,000." All this has been changed, and in the short space of one year. The privies have nearly all been emptied and filled up, and with them many of the cisterns. Thirty miles of sewers have been laid, and are in full operation; and with these are connected water-closets in number nearly as many as the privies reported by the National Board of Health: besides which forty-five miles of tiles have been laid, which drain the soil of all impurities, making Memphis not only one of the cleanest, but one of the healthiest, cities on the globe; reducing her death-rate from 35 per 1,000 to 28 per 1,000, — a difference of 20 per cent in one year. This, the latest and one of the best results of sanitation, will, I think, be conceded to "point a moral." To the active co-operation of the National Board of Health it is largely due. Their thorough survey showed the necessity for reform; and their practical suggestions, carried out, lifted Memphis to a front rank among the healthy cities of the world. The people of Memphis willingly acknowledge their indebtedness in this regard, and feel that the weight of obligation has been increased by the sentinel-like vigilance with which, during the summer of 1880, all the avenues by which yellow fever might approach our coast, or from the coast to the interior, have been successfully guarded.

RECAPITULATION.

I have endeavored in the preceding pages to show, —

First, The money value of population.

Second, The effects of epidemic and other preventable diseases in robbing nations of population, and, therefore, of productive capital.

Third, The beneficent results of sanitation in preventing or mitigating the effects of epidemic and other preventable diseases; in saving population, and, therefore, a vast amount of productive capital, thus exemplifying the value of sanitation from an economic stand-point.

Fourth, I have endeavored to express the inestimable services of the National Board of Health in its vigilant watchfulness against the introduction or spread of yellow fever, exemplifying the value of the "ounce of prevention," and the economy exercised by the government in organizing and providing for that body. And in this connection I beg leave to suggest that this Association recommend to the National Government the continuance of the National Board of Health with greatly increased powers.

1. Because, as an advisory organization sustained by national authority, it has already been of value beyond many times its cost, and because it guarantees protection against the introduction of epidemic diseases for all communities under uniform rules uniformly enforced.

2. Because it guarantees faithful and efficient service, free from local prejudice.

3. Because its agents, by their vigilance, unaffected by trade or other considerations, by prompt warning, save the coast-cities and those of the interior from the introduction of epidemic diseases.

4. In addition to this clerical, sentinel, and advisory work, it should have

authority to enforce its edicts on all the navigable waters and everywhere within the marine jurisdiction of the United States, so as to control the movements of vessels. It should at certain stations abroad, as well as at home, be empowered to employ scientific experts to observe atmospheric and telluric phenomena, the influence of planetary movement and conjunction, and note the character, and, if possible, discover the origin, of epidemic diseases. And such agents should not be limited to time; and they should have all the aid in instruments, apparatus, and assistance necessary to thoroughness in research and comprehensiveness and exactness of statement. We have learned already a great deal in regard to the law of storms, and by it have been able to reduce the yearly average of destruction to our commerce on the seas, and so have saved hundreds of millions of dollars' worth of property and hundreds of thousands of valuable lives. By the vigilant enforcement of quarantine by the National Board of Health, by its continued watchfulness to prevent the spread of epidemic diseases to the interior, and by the rigid and exacting enforcement of sanitary laws by city, county, and State authorities, — the absolute destruction of all matter injurious to life, so that the soil, air, and water may be rendered pure, — the chances for increased length of life may be greatly enhanced. "Knowledge is power." We must know to do. In this case science should inform us, and the law — State and national — ought to be invoked to compel performance of whatever may be essential to perfect safety. The endowment, by Count Rumford, of the Royal Institution of London, secured to the world the incalculable benefits which followed upon the investigations and discoveries of Sir William Young, Sir Humphry Davy, Michael Faraday, and John Tyndall. The proper endowment of the National Board of Health with powers and means may result in such an increase of the knowledge of the origin and means of preventing the spread of epidemic and other preventable diseases as will save to the republic hundreds of thousands of lives, and, therefore, wealth in proportion greater than the appalling losses by epidemics in part set forth in the above paper.

XXIV.

A CONSIDERATION OF THE OBJECTIONS URGED BY SOME EVOLUTIONISTS AGAINST SANITARY LAWS, BOARDS OF HEALTH, AND THE STAMPING-OUT OF CERTAIN EPIDEMIC DISEASES.

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Inasmuch as strenuous objections have been urged against the methods usually advocated for the prevention of contagious or spreading diseases, it has been deemed well to preface the discussion on this subject with a consideration of some of these objections; and, by request, I have undertaken this share of the discussion.

Human reason, whenever baffled in detecting the causes of natural phenomena, always hastens to assign to them a supernatural causation; and if these phenomena are injurious and irremediable, then reliance in supernatural remedies becomes as complete as in supernatural causes. If, with this consideration, we recall how little we know, notwithstanding enormous progress in recent times, of the causation and prevention of disease, we can better realize how dense was the ignorance of remoter periods, and can better comprehend why our ancestors were, during many centuries, cursed with a blind faith in what the Rev. Samuel Haughton denounces as the "will-of-God theory" of disease. For more than a thousand years our Christian forefathers, when afflicted by disease, above all by epidemics, enjoyed no faith in measures for relief other than miraculous interventions and special dispensations of Providence: prayers, holy pilgrimages, miracle-cure, shrine-cure, and the relics of martyrs and saints, were the most trusted, and often the only, remedies in their pharmacopæia. This barbarous superstition was so universally and so long maintained, that striking relics of its persistence are still to be found in every country. Even in 1878, in the United States, several governors promulgated pious proclamations to arrest the spread of yellow fever, which, in spite thereof, continued its ravages until checked by such usual and natural causes as diminished intercourse and lowered temperature. But, in order to mark the contrast between past and present, recall the fact that our ancestors placed all reliance in God and none in themselves, thus strangling the inauguration of sanitary measures, while in 1878 the continued faith in God favored rather than prevented the humane North from forwarding millions of dollars to relieve the stricken South; and this faith did not prevent the inauguration of a National Board of Health, nor the cleansing of Memphis,

nor the formation of the New Orleans Auxiliary Sanitary Association, nor the adoption of many other worldly measures for better protection. So great is the contrast, as respects the prevention of disease, between the inert fatalism of the past and the active intervention of the present, that every sanitarian has been confidently indulging the hope that mankind is now on the borderland of a future wherein all men would fully realize that man holds his earthly destiny in his own hands, and that diseases can be, in greater part, eradicated by a wise but active subserviency to nature's laws. This well-founded hope has seemed to justify the sanitarian in entreating his fellow-citizens to cease maligning God by attributing to him evils due solely to their own ignorance and negligence; in teaching the people and their rulers that the price of public health, as of liberty, is eternal vigilance; in urging the vigorous application of all prophylactic knowledge yet acquired; and in spurning hopeless inaction in all cases except in *those only* wherein action would surely prove injurious: for, even when success is doubtful, experimental efforts are the surest means by which to gain the knowledge which will eventually bring success.

Is the hope which has blossomed over the grave of the fatalism of the past destined to be blighted by the new and growing faith in the law of evolution, — that grand law which constitutes the most important discovery of the nineteenth century, stimulates every department of knowledge, and teaches a mightier conception of the great Creator? It is not doubted that sanitarians are, for the most part, evolutionists, at least to the extent of the belief that gradual development, thereby the progress of all things, including man himself, is the law of universal nature; nor is it doubted that all will concede that Herbert Spencer is the ablest apostle of the doctrine of evolution; that his views, always suggestive, are entitled to the serious consideration of intelligent men; and that the opinion of a minority, even of one man, against the world's opinion, may be now, as it often has been heretofore, the expression of the truth. Admitting these premises, and that sanitarians love truth above all things, it follows that they should consider well the views, so antagonistic to their own, of the apostle of evolution. Thus knowledge may be gained to arm ourselves with new weapons to conquer new foes, and to conduct with greater success our incessant warfare against disease.

Spencer, in his volume on "Social Statics," vigorously opposes the promotion of sanitation by the enactment of any laws, whether by a nation, by a State, or by a municipality. He denounces all boards of health as veritable impediments to sanitary progress: and he leaves little doubt that he considers all those who do not concur with his views as merely "amiable people" whose weak-minded sympathy strives after measures, which, in his opinion, are "very injudicious, and, in the end, even cruel;" as "flippant red-tapists," striving to stick "a patch upon nature;" as "meddlers" with nature's all-sufficient laws; as "self-appointed nurses to the universe;" as "creation-menders;" and finally as "spurious philanthropists."

Inasmuch as these contemptuous denunciations not only apply to the most

illustrious statesmen and physicians of modern times, as well as to the members of this Association, but also fail to indicate the possession by Spencer of the imperturbable dignity and unimpassioned judgment which should characterize a great philosopher, it would accord with human infirmity if sanitarians received these denunciations with indignant antagonism. However, reason and love of truth should triumph over the the natural prejudice thus aroused, and patiently give ear to the arguments by which these denunciations are justified.

Insisting that a social organism is no more than a voluntary union of men exclusively for mutual protection, Spencer establishes his first and his sole principle for this protection, and for the government of this voluntary union; and he terms his "first principle," "the law of equal freedom." He defines and explains this law as follows: Every man should have perfect freedom to do "all that his faculties naturally impel him to do;" "all that he wills, provided he infringes not the equal freedom of any other man;" and, in order that there may be no aggression on any man's inalienable right to do "as he wills," it is deemed imperative that "the duty of the State is to protect, to enforce the law of equal freedom, to maintain men's rights, — or, as we commonly express it, to administer justice;" and that "the State ought not to do any thing but protect." It is insisted that the plea of expediency, however urgent, can never justify the State in departing from its sole duty of protecting the equal freedom of every unit of the social organism. Since life, property, and liberty are indispensable to equal freedom, they are proper subjects for State protection; but health should not be protected by the State, for the following various reasons: —

The protection of a man's health is a right which belongs, and a duty which he owes, to himself; and this duty cannot be assumed by the State without infringing upon the law of equal freedom, without aggressing upon a private right, and without retarding man's adaption to the conditions imposed by nature on his existence. The development of self-helpfulness is a supreme requirement for permanent progress; and any artificial performance by the State of the work which each person should do for himself must check the development of self-helpfulness. Ignorance should not be put by art on a par with wisdom, unless it be desired to check the growth of wisdom. Admitting that health should be protected by law, it becomes impossible to see how far this interference should go, and necessary to admit that the State should regulate the quality, quantity, and proper time for the use of the food, drink, baths, clothes, exercise, and sleep of every person. Since enormous sanitary progress has been made during recent centuries by natural causes, such as by great progress in those arts of civilization and in that knowledge which promotes health, and since this natural progress has been accomplished without artificial sanitary administration, this progress should not be tampered with by the State, but should be left, as heretofore, to that provision of nature which causes it to respond to every new demand, — to "the inherent adjustment of things." Experience proves that sanitary laws and officers fail to

accomplish their purpose; that there is always some inevitable IF to defeat the hoped-for object of their existence; and, finally, even if they could attain their purpose, sanitary success thus gained would retard the development of some other thing more essential to human progress, such as the "self-helping character" indispensable to the permanent welfare of the social organism.

For the reasons now stated, Spencer teaches, in his "Social Statics," that all sanitary laws and officials are artificial interferences with, and actual impediments to, the natural evolution of sanitary progress, the development of which cannot, in his opinion, be permanently promoted by any methods other than those which promote the growth and dissemination of sanitary knowledge among the people, — by such methods as preaching, lecturing, teaching, and publishing this knowledge, until it becomes so universal that every man will voluntarily do for himself, and unite with others to do for an actively obedient community, all possible things requisite to protect private and public health. Hence this Association met Spencer's full approval until it used its influence to establish boards of health, and to secure other sanitary laws; and the New Orleans Auxiliary Sanitary Association, actively engaged in sanitary improvements, would be his *beau idéal* of the great desideratum for sanitary progress, provided that this Association would refuse to be, what its title avows it to be, auxiliary to the sanitary laws and officials of this city and State. In fine, Spencer has entire faith in the development of sanitation by individual intelligence, and by the union of intelligent citizens into such voluntary associations or corporations as have so notably developed marine transportation, railroads, telegraphs, and numerous other branches of commerce, manufactures, agriculture, etc.; and he has no faith whatever in such legislative corporations as boards of health, or in any such laws and officers as legislators must, in violation of the law of equal freedom, usurp the right to establish.

As Spencer has marshalled against sanitary supervision by the State all the opposing arguments since used by others, no just objection can be urged if the "*argumentum ad hominem*" is chiefly employed in discussing his views. Hence there will be no hesitation in summoning Spencer to bear witness against, as well as in favor of, his own views; and, in case these are thus refuted, it will be claimed, that neither the law of evolution, nor any law of equal freedom now practicable, proves the conclusions taught by him. Therefore attention is now solicited to six considerations adverse to Spencer's conclusions, and derived from the same book ("Social Statics") from which has been collected every thing already stated in favor of his conclusions: —

First, Spencer's consideration of sanitary supervision by the State constitutes only one chapter and a subordinate fraction of a vast, coherent, and designedly perfect system of sociology. With his usual candor, he emphasizes the fact that the very same or analogous objections apply with equal force to many other subjects which are commonly, but most erroneously, deemed proper for State interference. Among the subjects denounced equally with sanitary supervision are the following: Governmental religious establishments, colonization, regulation of commerce, national currency, postal service, public

education, poor-laws, and public works of all kinds, such as lighthouses, harbors of refuge, canals, roads, railroads, drainage, sewerage, paving and lighting of streets, jetties, levees, etc., all of which should be left to private enterprise. In addition, Spencer denounces the taxation of any individuals by the State for its administration of the justice due to him without special charge as grossly unjust; the appropriation to individuals of the soil, which, by nature, belongs equally to all men, as a "usurpation and gigantic injustice;" slavery as a "barbarous outrage;" war as a fearful wrong; the coercion of wives by husbands, and of children by parents, as outrages on the law of equal freedom; anti-democratic governments as unjustifiable; the right of majorities to rule minorities as a "political superstition;" and, finally, coercive government of any kind as immoral. These facts prove that Spencer denounces the national and every State constitution in the United States, as well as every government ever devised by man, and that he concedes that sanitarians have as much right to demand from the State the protection of health, as to demand State interference for the regulation of commerce, the promotion of public education, the provision of asylums, hospitals, and of other aid for the indigent, the establishment of public works, etc. Now, since sanitarians are subjected to conditions of existence which force them to submit to these Spencerian outrages, it seems evident that these unfavorable conditions justify them in demanding from the State the additional, but no greater, outrage of protecting the public health. It is something to the sanitarian, who is an evolutionist, thus to gain assurance that sanitarians are at least no worse than all their other fellow-citizens, and that the conditions of their existence excuse their alleged meddlesome interference with nature, their "sickly sentimentalism," and their spurious philanthropy.

Second, The unanimity and persistency of all nations in constantly violating Spencer's perfect "law of equal freedom" conclusively prove that these violations are requirements of nature indispensable to progress, and therefore in accord, at least, with the law of evolution, and that his fierce denunciations of these violations find justification in a contemplated perfect social organism in the future, and not in the contemplation of the past and present conditions of man's existence. "Social Statics" abounds in lessons, some of which will be cited, proving the correctness of these conclusions.

Spencer says, "The manifold evils which have filled the world for these thousands of years — the murders, enslavings, and robberies, the tyrannies of rulers, the oppressions of class, the persecutions of sect and party, the multiform embodiments of selfishness in unjust laws, barbarous customs, exclusive manners, and the like — are simply instances of the disastrous working of *the original* and *once needful* constitution, — now that mankind has grown into conditions for which it is not fitted, are nothing but symptoms of the suffering attendant upon the adaptation of humanity to its new circumstances." All these outrages against the perfect law of equal freedom were necessary, and were simply illustrations of the *modus operandi* of the law of evolution; for, says Spencer, "the aboriginal man *must* pursue his outrageous course in order

to develop into the perfect ultimate man." "The course of civilization could not possibly have been other than it has been." "No other series of changes than that which has taken place could have taken place." And as long as, but no longer than, the injustice of violations of the law of equal freedom is not perceived, they "are, *on the whole, beneficial.*" Now, is it possible to avoid the suspicion, that since the conditions of existence of our barbarous ancestors caused religious persecution, brutal conquest, slavery, and despotism, to be, "on the whole, beneficial," the unfavorable conditions of existence of the present most imperfect man may cause such lesser outrages as national education, poor-laws, public works, and even sanitary supervision, to prove also, "on the whole, beneficial"? Spencer leaves no doubt about the correctness of this suspicion.

He fiercely denounces war, yet insists that it still is "often indispensable," because only by this great wrong can the State protect the people from greater wrongs. He teaches that the regimen suitable for the healthy may be very dangerous to the sick; that his perfect law is incongruous with imperfect men; that, while it is the only safe guide, it cannot be fulfilled by them; that, the worse the condition of society, the more visionary this law must appear to be; that, in considering the conditions man is now subjected to, his *existing* but imperfect institutions are "*the least wrong* institutions now possible;" that these should be perpetuated as long as they can be, since they will continue to prove beneficial as long as men fail to appreciate and do willingly submit to their imperfections, and until they have learned to supersede them with more perfect institutions; that men still require legal shackles, and rulers to impose them; that, "like other organisms, the social organism has to pass, in the course of its development, through temporary forms, in which sundry of its functions are fulfilled by appliances destined to disappear as fast as the ultimate appliances become efficient;" and, finally, that men may be well assured, that, to hasten social development, nature's greatest need is for sincere belief, healthy faith, fidelity to conscience, wherever this may lead.

Is it not now manifest that Spencer's denunciation of sanitary supervision by the State flows from the violation thereby of his perfect, but admittedly impracticable and visionary, law of equal freedom? And is it not manifest, that, even from a Spencerian stand-point, this supervision is justifiable, for this, if for no other, reason, — that the continuous development of sanitary laws and boards of health among civilized nations during the past thirty years proves that these are destined to be forms and appliances (even if temporary) for the fulfilment of a most important function of the social organism, — forms and appliances through which it "has to pass in the course of its development"?

Throughout "Social Statics" it is made evident that Spencer hurls his shafts of satire and ridicule against existing institutions from the ideal platform of his perfect law of equal freedom, and from the at present inaccessible heights of the Spencerian millennium, wherein the ultimate man (perfected product of evolution) is to play the *rôle* of those saints who, according to the Book of Revelation, are yet to reign on earth. From this stand-point many existing

institutions are absolutely wrong; while, from the stand-point of existing conditions, they are relatively right, and are emphasized as, "on the whole, beneficial."

While the two previous general considerations suffice, in my opinion, to counterbalance in large, if not in full, measure Spencer's arguments against sanitary supervision by the State, and fully to prove that this is not at variance with the law of evolution, there are yet four special considerations deserving notice.

Third, Spencer urges that "the duty of the State to protect the health of its subjects cannot be established," because of "the impossibility of saying how far the alleged duty shall be carried out;" and he adds the following inquiry and response thereto: "Where, between a universal supervision of private conduct and no supervision at all, lies the boundary up to which supervision is a duty? To which question no answer can be given." It will surprise no one that Spencer could not answer this question when informed that he entirely failed throughout his book to make any distinction between public and private hygiene, and that every one of his numerous and unfavorably criticised examples was drawn exclusively from the latter (see pp. 315, 418, of "Social Statics"). In spite of his inability to answer, his own perfect law of equal freedom furnishes the answer, and establishes just "how far the alleged duty shall be carried out." For is it not true that every man should have freedom to secure as much benefit for, and to inflict as much injury on, his own health as he wills, "provided that he infringes not the equal freedom of any other man" to secure for his health as much benefit and as little injury as he wills? Sanitarians demand this, and nothing more, from the State.

Laws protecting health, the *most valuable possession* of a freeman, are as justifiable as are the laws which Spencer insists the State should enact to protect his property; and it is as possible in the one case as in the other to define "the boundary up to which supervision [of health by the State] is a duty." The sanitarian insists, in fact, that a man's health is property, and more valuable than his purse. Let him waste either, if *he* wills; but he shall not waste either in injuring others against *their* will. Further, since it is the duty of specially competent citizens to suggest remedies for violations of the rights of property, of legislators to provide means to apply these remedies, and of special officers to administer them, it is equally the duty of sanitary experts to suggest remedies for violations of every man's right to health, of legislators to provide means to apply these remedies, and of boards of health or other special officers to execute the measure provided. Admitting that social progress primarily requires from the State protection of life from violence, of property, and of liberty, it is confidently claimed that the next important step for further progress, due by the State to every citizen, is the protection of his life from disease inflicted against his will by others; and that the duty of the State to furnish this protection is taught by the very same arguments used, as strongly by Spencer as by every one else, in behalf of the protection of life, liberty, and property.

Fourth, Spencer's arguments against sanitary supervision are invalidated not only by his failure to mark the difference between public and private hygiene, but also by his failure to consider whether sanitary laws and boards of health might not and did not hasten instead of delay the acquisition by the people of that sanitary knowledge which he insists is the only desideratum for promoting sanitary progress. It is deemed too manifest to require proofs in detail, that the experience of civilized nations during the past thirty years has conclusively demonstrated that sanitary laws and boards of health have promoted the general acquisition of sanitary knowledge, and have thereby tended to develop that very self-helpfulness which Spencer hastily declared would be greatly interfered with by the adoption of such artificial measures. These measures have thus far borne well that test which an evolutionist, who is at the same time a famous philosopher and historian, teaches should be applied to all political institutions; namely, that they "should tend to the improvement and organization of national intellect."

Fifth, Spencer's arguments are further, and in my opinion fatally, invalidated by the following notable admissions. He writes, "That it comes within the proper sphere of government to repress *nuisances, is evident.* He who contaminates the atmosphere breathed by his neighbor is infringing his neighbor's rights. Men having equal claims to the free use of the elements, having faculties which need this free use of the elements for their due exercise, and having that exercise more or less limited by whatever makes the elements more or less unusable, are obviously trespassed against by any one who unnecessarily vitiates the elements and renders them detrimental to the senses; and, in the discharge of its functions as protector, a government is *obviously* called upon to afford redress to those so trespassed against."

Inasmuch as these admissions concede to sanitarians their essential demands, it is incomprehensible to me that Spencer should indulge in denunciations which he launches against all sanitary laws, against boards of health, and against sanitarians. For what citizens, unless sanitary experts, can determine what are, and can devise the remedies which should be applied for, contaminations detrimental to health of the air and of the "elements" (which are presumably water, soil, and food, as well as air)? by what mechanism, except that of the law, can these detrimental contaminations be defined, and means for their rectification be provided? and by what officers, other than sanitary experts, can these duties be efficiently executed? It is admitted that "nuisances" should be repressed by the State. What are nuisances? Any thing producing damage or even annoyance. What things damage health? The progress of sanitary science continually increases their number, and also the number and efficiency of the remedies therefor: hence sanitary laws must be as constantly increased by the State to repress these nuisances. This forces the State, under the present conditions of man's existence, either to organize a sanitary administration, or to refrain from using the most efficient means to repress sanitary nuisances, — a governmental duty which, Spencer declares, is "evident" and "obvious." To insist that it is the duty of the State to repress

trespasses on a man's health, and yet insist that the State should shift the discharge of this duty upon private citizens, whether individually or collectively, is a *reductio ad absurdum*. Even the fiercest sanitary enthusiast demands no more from the State than that it should wisely determine what are sanitary nuisances, should protect therefrom all persons who appeal for redress, and should provide the most efficient means to accomplish these ends.

Sixth, An enthusiastic evolutionist as well as sanitarian, I was tempted to a closer study of "Social Statics" by the denunciations therein heaped, by the most famous evolutionist, upon the doctrines advocated by the most famous sanitarians. Honoring the author exceedingly, I, on reaching the views and conclusions now stated, was greatly shocked that a philosopher so deservedly eminent should have treated public hygiene with so little dignity and so little wisdom. Anxious to preserve my respect, I was induced to exhaust my search for excuses in his behalf, and was thus finally prompted to do that which ought to have been done in the first place; namely, read the introduction and prefaces to his book (Appleton's New York edition, 1872). To my great gratification so far as Spencer was concerned, and to my great indignation so far as those were concerned who have abused his authority for the purpose of discouraging sanitarians, I found that Spencer wrote his book in 1850, when only a newspaper employee; that, even at that date, he apologized for "the manifestation of feeling" and for the sacrifices of "conventional dignity" displayed in this book; and that, as early as 1864, he warned the readers of this book, that, while he continued to hold the same doctrines "in their general character," yet that, "in restating them, he would *bring into greater prominence the transitional nature of all political institutions*, and the *consequent relative goodness of some arrangements* which have no claims to absolute goodness." It is thus made evident that I have done Spencer great injustice in employing the present tense to indicate very old views, advocated as long ago as 1850, and that those who quote these views to bring State sanitation and sanitarians into discredit are guilty of the grave misdemeanor of misrepresentation. The facts are, that Spencer advocated certain immature views at the very dawn of his philosophical career in 1850, that he had greatly modified these views in 1864, and that no man is authorized to state what are his present views respecting sanitation, nor will he be until the completion of the three volumes on the "Principles of Sociology," the work designed to crown his philosophical labors, and wisely postponed for his maturest consideration.

It is believed that the considerations now concluded sufficiently prove that the law of evolution is not contravened by sanitary administration; that this fulfils that law by providing a necessary, even if transitional, institution through which the social organism must pass in its progress to a more perfect development; that sanitary administration, if justifiable at all from the Spencerian stand-point, must be most justifiable when the product of universal suffrage, as in the United States; and, finally, that if sanitary administration violates even the perfect law of equal freedom, it does not violate any such equal freedom as is practicable under man's existing conditions. It is, then, an emi-

nently "healthy faith" which inspires your labors, and prompts you to demand from the State its support of public hygiene, and its protection, above all, from those epidemic diseases which have repeatedly shaken States to their foundation, paralyzing the discharge of their pre-eminent duty to protect life, property, and liberty.

In concluding this defence from the evolutionist's stand-point of sanitary laws, of boards of health, and of so-called sanitary "pseudo-philanthropists," against the assaults of pseudo-evolutionists, it is proper to remind you that their defence, from the stand-point of the law, was most ably presented in 1875 by Dorman B. Eaton, LL.D., and constitutes a part of the second volume of your transactions.

Your attention is now called to some views of Dr. H. M. Lyman,[1] who no more hesitates than I do to avow himself a disciple of Spencer, — views concerning the best methods for arresting the ravages of certain contagious or spreading diseases, and deserving your attention chiefly because probably antagonistic to your own views. He writes for the special benefit of "ordinary, average sanitarians" (such as we profess to be), and of the sanitary "busybodies of our day;" and he enforces the following lessons: —

No attempts should ever be made to stamp out "endemo-epidemic," or any "endemic virulent diseases," whose primitive causes are out of our reach; for instance, such diseases as are measles and scarlet fever in the United States. "The proper course" to pursue "is that which will favor their widest possible prevalence." By the greatest possible diffusion, and the most unrestricted prevalence of these diseases, their viri are attenuated: the epidemics caused thereby become more controllable. Inestimable, though unappreciated, advantages accrue to the community "from continuous personal and hereditary adjustment" to the causes of such diseases. The number of persons enabled successfully to resist these diseases by "hereditary tolerance" is most advantageously increased; and "the feeble offspring of the community," whose death is necessary for the preservation of the vigor of the human race, are most advantageously weeded out. "Any other course causes increased susceptibility, uncontrollable epidemics," and vitiation of the human race.

In further explanation of these views it is taught, that, when the causes of disease cannot be removed, then we must learn how to adjust ourselves to its presence; that, in the interests of universal humanity, it is the highest beneficence which "singles out the low-spirited, the intemperate, and the debilitated as the victims of an epidemic;" that scarlet fever, measles, etc., are, as is plain to "those who take a comprehensive survey of the subject," "diminished by their spread in the community;" and that, if they could be stamped out for a few generations, they would "sally forth from the wilderness," and more than decimate our descendants; that "man can neither create nor destroy force," — therefore (!) if he "stamp out one disease, another will inevitably spring up in its place" (for instance, if he "diminish the prevalence of

[1] See the New York Medical Record of June 26, Sept. 4, and Nov. 6, 1880; and pp. 88–102, v. iv. (1877), Transactions American Public Health Association.

scarlatina, diphtheria will occupy the field); that "heredity and natural selection" have "a modifying influence over the spread of zymotic diseases," "evolving a population more tolerant of the diseases with which it is continually acquainted than a population for the first time exposed to the influence of the same diseases;" and, finally, that, to appreciate these startling views, sanitarians have great need for "breadth of view," and to be "educated up to the broad level of science and philosophy," — especially of Darwinian science and Spencerian philosophy!

It is regretted that numerous vague statements and ambiguous expressions should have been so used in the presentation of these views as to hamper the satisfactory discussion of some of them. It would not be difficult to show the ambiguous usage, either from common or from the writer's abuse, of the most important expressions in even the chief propositions, such as "endemic," "primitive cause," "attenuation of viri," and "hereditary tolerance." Although logic turns its back on ambiguity, an attempt will none the less be made to consider fairly the two main propositions; and, if any misrepresentation results, it will be due to one of two causes, — either that these propositions are so presented that they are incomprehensible, or that their present critic has not been "educated up to the broad level of science and philosophy" necessary to comprehend them. For either of these deficiencies philosophy counsels patience and pardon.

These two main propositions are: First, that the poisons of measles, scarlet fever, etc., are attenuated by their diffusion and prevalence, and that, the greater "the pandemicity and continuity" of such virulent diseases, the less do their evils become; and, second, that, through heredity, "elaborated during successive generations," a "hereditary tolerance" of, or "hereditary resistance" to, these diseases is evolved, constituting a "most valuable and universal" method for adjusting mankind to these diseases, — a method which yields most beneficent results, while any measures interfering with the spread of endemic virulent diseases yield most injurious results.

I. The first question for discussion, then, is this: Does the pandemic diffusion and continuous prevalence of measles, etc., attenuate their poisons, and thereby diminish their evil results?

Two arguments are urged in the affirmative: namely, that, since every epidemic is eventually marked by a diminishing mortality and by final extinction, therefore (!) these results are due to attenuation of these epidemic poisons, and prove that this alleged attenuation is a reality; and that, since the prevalence of small-pox has been diminished by the diffusion of vaccine virus, which is alleged to be attenuated small-pox virus, therefore (!) the poisons of all endemic virulent diseases would be attenuated by their diffusion and their prevalence thereby diminished, as with small-pox. Some of the arguments in the negative are as follows: —

There is not one known thing, possessing the power of reproducing itself, which is not increased by its diffusion. If the accepted view be correct that the poisons of measles, etc., reproduce themselves, then these poisons cannot

be attenuated nor their evils be diminished by their diffusion any more than hydrophobia, gonorrhœa, favus, trichina, or anthrax can be diminished by their spread. If said poisons were like a fixed quantity of arsenic, strychnine, or snake venom, then they could be attenuated by their diffusion; but in this case the burden of proof is on Dr. Lyman, and it becomes his primary duty to prove that the world of science is at fault in its view, before he can have the slightest authority for disparaging sanitarians because they decline the attempt to attenuate reproductive poisons by planting them as widely and persistently as possible.

The assumption that the diminishing mortality and final extinction of epidemics are due to the attenuation of their exciting poisons is no more true than that the diminishing flame of a charred fagot is due to the attenuated oxidation; than that a diminishing fermentation is due to the attenuation of its ferment; than that the diminishing leaves of autumn are due to an attenuation of their producing seeds; or than that a diminishing number of fly-specks is due to an attenuation of flies. The spreading of reproductive poisons no more diminishes their intensity or the number of persons infected than the spreading of fire, or of ferments, or of seeds, or of animal organisms, diminishes their effects. If these poisons cause non-recurrent disease, then, of course, very manifest and well-known results ensue, — such as the weeding-out of the susceptible, and the extinction of the disease, until such time as may be necessary to re-introduce a susceptible population, and to revive or to re-introduce the poison. It is not understood that these important results of a manifest cause are involved in the present discussion, except in so far as they may be attributed, as they appear to have been, to other causes.

The second argument, when re-enforced by universally admitted facts, justifies the following syllogistic presentation of it: The vaccine poison is attenuated small-pox poison; but, instead of causing, it arrests, a spreading disease, — namely, small-pox. Therefore this attenuated poison should be as widely diffused as possible: *hence* the measles poison (which is not attenuated, and does not arrest, but, in fact, causes a spreading disease, — namely, measles) should be as widely diffused as possible, and *thereby* be attenuated. Yet, shades of Whewell and of Mills! the author of this inconsequential argument complains that sanitarians are *illogical!* What, pray, does it matter to the practical sanitarian whether vaccine virus is or is not attenuated small-pox virus, when the sole important fact to him is, that by artificially diffusing the vaccine disease he forthwith arrests small-pox, while by diffusing measles he as evidently does not forthwith arrest measles? The inference drawn — from comparing the vaccine poison, even if it should be attenuated small-pox poison, and the small-pox poison itself, with the measles poison *in puris naturalibus*, and this very same poison — is nothing more than the triumph of scientific fancy over common sense.

Further, if it be best to diffuse the disease-poisons whose causes we do not know, how is it that it certainly is not best to diffuse the disease-poisons whose causes we do know? Who would advocate the feasibility of diminishing

hydrophobia by diffusing mad dogs, or trichinosis by diffusing diseased hogs, or itch by diffusing the sarcoptes scabei, or typhoid fever by diffusing its fæcal discharges? Still further, if the pandemic diffusion and continuous prevalence of endemic virulent diseases attenuate their viri, then Cuba ought now, after more than a century of the increasing diffusion and continuous prevalence of yellow fever, to witness that which it very certainly does not witness, — some marked evidence of the attenuation of the poison of this disease.

The views advocated respecting the attenuation of certain viri by their diffusion, and the consequent diminution of their evils, are based on such groundless assumptions, that it is even difficult to imagine how such views could have been *conceived at all.* Some assistance in solving this problem is gained by the knowledge that Dr. Lyman holds the two following assumptions also as truths: he teaches that typhoid, typhus fever, and "their congeners," also relapsing fever, anthrax, cholera, and yellow fever, are not only contagious, but also can originate spontaneously; for instance, that the poison of yellow fever is "a miasm, formed by the decomposition of excreta in contact with organic *débris* in the presence of moisture at an elevated temperature of the atmosphere;" so that this disease is liable to originate in the Southern United States at any time "when the conditions of heat and moisture and human filth concur in due proportion."[1] How silly for the "ordinary average sanitarian" to attack these numeras hydras, before which superhuman Hercules, the boss sanitarian, would have quailed! He further teaches, that, since man can neither create nor destroy force, therefore (!) if he succeeded in stamping out one disease, another would spring up in its place, as diphtheria in place of scarlatina; thereby implying that there is a special disease-force not correlated with other forces, and that the forces on which depend the growth of diseases — say, potato-rot and scarlet fever — cannot be transformed into forces which will swell the pulp of a healthy potato, and redden the glow on an infant's cheek. Again, if there be a disease-force, and this exist in fixed quantity, why attempt the fruitless task of destroying it? why not diffuse and so attenuate it, that, while every man will get a little, no man can exceed his share? And, if a man's due share of the universal dose weeds him out, then all the better for the vigor of the race and for universal humanity! Is it credible that such incredible and discredited assumptions as are these come down to sanitarians from the "broad level of science and philosophy"?

II. The second question for decision is the following: Does heredity elaborate, during successive generations, a tolerance of or resistance to endemic virulent diseases? and does heredity effect this to such extent as to constitute this resistance a "most valuable defence" against such diseases,

[1] See pp. 88–102, Trans. American Public Health Association, vol. iv. It also deserves notice that in 1877, Dr Lyman found Pasteur guilty, respecting the bacillus anthracis, of "exceedingly audacious assumption," while in 1880 he concludes that Pasteur's researches on the germ of chicken-cholera "are fraught with an importance not yet suspected by the average unscientific sanitarian."

so valuable that their pandemicity and continuity should be encouraged in order that universal humanity may more promptly acquire this unestimated yet inestimable power of resisting them? The advocate of this view assumes that an affirmative answer is unquestionably true, needs not the rigid proofs scientists demand, and hence is afflicted with none of their doubts.

Among others, Prichard, Elam, Ribot, Spencer, Darwin, and Holland have exhausted their own experience and all published records in their search for examples illustrative of the multiform influences of heredity; yet not one of these authors (while presenting much evidence in favor of an hereditary tendency to certain diseases) has presented any proofs of hereditary resistance to disease, and not one of them justifies the dogmatic claim insisted on by Dr. Lyman. Immunity from disease (especially from the non-recurring diseases now in question) must be gained by the mutilation or alteration of some physiological structure; and the accidental condition thus acquired by parents must be transmitted to their descendants, in order that these should acquire any hereditary resistance or immunity. Now, what are the general facts thus far secured by science on this subject?

Prichard teaches, that "nothing seems to hold true more generally than that *all acquired* conditions of body, whether produced by art or accident, *end with the life* of the individual in whom they are produced;" and he illustrates this by the non-heredity of the mutilations and alterations which some savages — for instance, the Flat-head Indians — have practised during many successive generations, by the non-heredity of the Chinese foot arrested in its development, and by the non-heredity of the circumcised prepuce practised by the Jews for several thousand years. Elam teaches, that "every formation of body, internal or external, every deformity or deficiency from disease or accident, every habit and every aptitude, are all liable to be or *may be* transmitted to the offspring. In case of *accidental* defects and modifications of the specific type, *the offspring usually do not inherit them*, but return to the normal type." Ribot teaches, that "acquired modifications can certainly be transmitted;" but "facts seem to show that these deviations from the type tend to return to the normal state, and that *the law is that accidental states are not perpetuated*, but that, after subsisting for a few generations *at longest*, they first grow fainter and then disappear." While Spencer, by his omission to make any claims for any hereditary resistance to disease, implies that he found no good evidence therefor, Darwin teaches, that, "with respect to the inheritance of structures mutilated by injuries or altered by disease, it is difficult to come to any definite conclusion;" that is to say, that if there be any conclusive proofs of hereditary resistance to disease, Darwin could not find them: and he indicates as plainly as do all other authorities, that, if any such resistance is ever developed, it is developed only occasionally, and not habitually. Dr. Lyman's exorbitant demand on heredity was suggested with due moderation and commendably scientific modesty, in 1856 (probably, even as early as 1839), by Sir Henry Holland, who then said that evidence warrants the *opinion* "that repetition of a given disorder through successive generations *may* alter the liability to receive it under its most severe forms."

These various quotations suffice to prove, that, if hereditary resistance to disease exists at all, this resistance is manifested so obscurely, slightly, and slowly, that science does not yet justify any one in assuming that it is a universal, all-pervasive, and most valuable defence against disease under the ordinary conditions of man's existence.

In support of the demand made on heredity, the diminished severity and prevalence of syphilis throughout the civilized world, of measles in the United States, of malaria in Africa, of yellow fever in Cuba, and of cholera in India, are cited. Not one of these instances can stand the test of criticism; and, since this would prove tedious, and also, as is believed, unnecessary, it will suffice to suggest one general comment. If these diseases have been diminished by heredity, and if their spread ought to be encouraged in order to secure from them the blessings of weeding out those unfit to survive, and of securing for the future a more vigorous race, then how does it happen, that, wherever such diseases are most prevalent, there the human race has degenerated? Where can one country be found wherein malaria, yellow fever, or cholera has continuously prevailed, that is not a country wherein the deaths exceed or encroach upon the births, — wherein the inhabitants are not physically, as well as morally, degenerated specimens of a vigorous race? Surely, never was any blessing so disguised as is this alleged "most valuable" hereditary resistance to disease![1]

Are there other causes which fully and satisfactorily explain the great diminution of certain virulent diseases in all civilized countries, and thus deprive us of all excuse for presuming to make any questionable demands for the explanation on that most uncertain cause, heredity? Very certainly there are; and it is these unanimously admitted causes which inspire the sanitarian with enthusiasm, and justify his rational experimental efforts (however abortive one after the other of these may prove to be) to stamp out every contagious and spreading disease on the face of the earth. Mankind must not be permitted to forget what were the conditions of their existence about three hundred years ago, the period contrasted by Dr. Lyman with the present. Then the "black death," the plague, the sweating sickness, the jail-fever, scurvy, small-pox, syphilis, and other virulent diseases, caused such frightful ravages that this generation may well stand aghast. The blessings due to the total dis-

[1] Even if the claim made in behalf of the gradual development of an hereditary resistance to certain diseases could be established, it would not by any means be thereby proved that it would be best for man, under existing conditions, to undergo all the suffering and delay necessary to eventually develop a universal insusceptibility. By constant nudity man might develop a protective covering of hair; but the conditions which render this needless are much more favorable to human progress. The ultimate survivors of ancestral exposure to malaria might be possibly, but most improbably, malaria-proof; but drainage yields, in any case, far better results.

"Survival of the fittest" influences, of course, the results of continued exposure to disease; but the favorable results thus brought about should not be confused with those alleged to be due to immunity from a disease (especially a non-recurring disease) developed in descendants because their ancestors had suffered therewith.

appearance or great diminution of these diseases are inestimable. Have their disappearance or diminution been due to the attenuation of their viri through the diffusion of these diseases, and to an elaborated hereditary resistance to them? A visit to our English, and, generally, to our European, ancestors of about three hundred years ago will suggest the answer, and may repay us. Our best historians report, that, at that period, the vast majority of our ancestors — namely, the "common people" — were subjected to the following conditions of existence: [1] —

War, Famine, and Pestilence. — Incessant wars increased the frequency of famines; these aggravated pestilences; the poisons of these, scattered broadcast by those unsurpassed diffusers, marching armies and marauding soldiers, produced a "pandemicity and continuity" of spreading diseases to an extent which, however much now commended, kept the people wretched, degraded, and "thinned out."

Wages. — Macaulay states that *only* two hundred years ago, after great social progress, the wages of the common people in England barely averaged a dollar to a dollar and a half (four to six shillings) per week without board; that nearly all the prime necessaries of life were dearer than now, and that one-fifth of the total population were helped to live by the public "poor-rates."

Malaria in the Country. — England had "fens forty or fifty miles in length, reeking with miasm and fever," and inhabited by "ague-stricken peasants."

Streets. — In towns "the streets were filthy beyond expression. After nightfall a passenger went at his peril; for chamber-windows were opened, and slop-pails were unceremoniously emptied down." These streets were infested with swarms of domestic animals; were destitute of lamps. Some were only six feet wide, and many were too narrow for a cart to pass. Crooked, unpaved, filled with rotting vegetables, animals, and offal, they were "very unsavory as well as very filthy."

Houses. — The houses of the common people were "made of reeds or sticks, plastered over with mud." "The fire was chimneyless:" and from the fireplace "smoke escaped as best it could without the help of chimneys; for these, though introduced in the twelfth century, were but slowly acclimatized." The dark, ill-planned houses, cut off from fresh air and sunlight, had "no windows of glass nor even of oiled paper;" and it was not until the first half of the eighteenth century that house ventilation began to excite some attention. The rooms had mud floors, "covered with straw, sedge, or reeds, and rarely with tiles or slates." Even of the palace of Greenwich it is stated, that, "though fresh rushes were supplied from time to time, there would remain, sometimes for twenty years together, a substratum of the most nauseous and disgusting description; and it appears from earlier accounts, and from certain civic restrictions and regulations, that this loathsome mess was at length turned out into the narrow streets, to be consumed by dogs,

[1] The works of Hume, Macaulay, Draper, Haecker, and Dr. W. A. Guy, furnished the following citations.

cats, pigs, and poultry, or imperfectly washed away by the rain." In the country, "houses, stables, and offices were under one roof;" and even the country gentleman had "the litter of the farmyard gathered under the windows of his bed-chamber." "The prisons were hells on earth, seminaries of every crime and of every disease." Filled in largest part with debtors, these were so crowded together that an allowance of only a hundred and fifty cubic feet to each was common. No bedding, not even straw, was provided; and those who procured straw often used it until "almost worn to dust," while "some laid on rags, some on the bare floors. The prison-rooms were without fireplace or sewer, and so extremely offensive that those who tarried in them stunk for hours. In fine, the crowded debtors' prisons presented an unparalleled combination of physical and moral evils, a seething mass of crime, misfortune, low vice, and debauchery," and so continued until John Howard's day, about 1774.

Bedding and Clothing. — The common people slept on piles of straw, "on straw pallets or rough mats;" and even the townsman's "bed was a bag of straw, with a fair, round log for his pillow." "The sheep's skin was in common use as clothing;" but, "if a man was in easy circumstances, his clothing was of leather, while, if poor, a wisp of straw wrapped around his limbs kept off the cold." "Vermin abounded in the clothing and beds." Only in modern times, and by very slow degrees, did "articles of cotton and linen come into use as clothing worn next to the skin, easily cleaned and readily changed, and soap, soda, and potash find their way into every household as abstergents." In these good old days, personal uncleanliness, even a religion with some, was unavoidable with the many; so that even the plumed knights and noble gentlemen (so often envied by the callow youths of our day) were forced to resort to the strongest perfumes to enable them to endure a congregation of themselves.

Diet. — "There was no commerce to put off famine," which frequently occurred. "The common food was pease, vetches, fern-roots, and even the bark of trees." If the rural population were "able to procure fresh meat once a week, they were considered to be in prosperous circumstances; and one-half the families in England could hardly do that." The chief animal food was salt meat. Rye bread was used instead of wheat; vegetables were uncommon articles of food; and even the potato was very slowly introduced by modern civilization. Drunkenness was in England universal: to drink until literally "under the table" was a common habit. Only within recent times, and very slowly, have tea, coffee, chocolate, and tobacco been introduced into common use, supplanting in some measure the excessive abuse of beer and ardent spirits.

Licentiousness. — The fearful spread of syphilis demonstrated the secret wickedness of society, and the frightful immorality of the times. "If contemporary authors are to be trusted, there was not a class, married or unmarried, clergy or laity, from the Holy Father Leo X. to the beggar by the wayside, free from it." "To so great an extent had these immoralities gone, that it

was openly asserted that there were one hundred thousand women in England [when the total population was only five millions] made dissolute by the clergy; and it was well known that brothels were kept in London for their use." "In the case of mortal sin," an ecclesiastic could commute it for less than two dollars; i.e., for "six shillings and eight pence." For such reasons the march of syphilis "was equable, unbroken, universal," devastating the whole of Europe.

Crowding. — As wars were constant, armies, which have always proved to be the crowds best adapted for diffusing epidemics, were ever in motion. "Cities were crowded fortresses, narrowly built, kept in a filthy state, and surrounded with stagnant ditches." Queen Elizabeth proclaimed, as to London, that "the poor people inhabiting small rooms were heaped together, and in a sort smothered," and therefore prohibited the building of any more houses within three miles of the city.

A final reminder will conclude this brief record of past sanitary conditions, of which sufficient relics still remain, to convince us that these conditions have not been exaggerated. An historian teaches, that, for the common people, the only physician was the monk with his crucifix, and that the only sanitary provisions were the *paternoster* and the *ave:* so that epidemic diseases were completely unrestricted, rioting in Dr. Lyman's commended purgatory of pandemic diffusion and continuous prevalence.

The results of the grossly insanitary evils now stated were such, that even as recently as 1685 — not a sickly year — the death-rate of London was 43.5 per 1,000 population, while in recent years this death-rate has little exceeded one-half of this. Macaulay says that the difference between London in the seventeenth and in the nineteenth century "is very far greater than between London in an ordinary season and London in the cholera," and furnishes the following additional lesson: "It is now the fashion to place the golden age of England in times when noblemen were destitute of comforts, the want of which would be intolerable to a modern footman; when farmers and shopkeepers breakfasted on loaves the very sight of which would raise a riot in a modern workhouse; when men died faster in the purest country air than they now die in the most pestilential lanes of our towns; and when men died faster in the lanes of our towns than they now die on the coast of Guiana. We, too, shall in our turn be outstripped, and in our turn be envied." It is to promote this anticipated result for our descendants, that sanitarians contribute their enthusiastic labor. Recalling the means by which those terrible foes to human progress, the "black death," the sweating sickness, the jail-fever, scurvy, and small-pox have been scotched, if not killed, sanitarians will continue to advocate the perfecting of all those means which experience has proved, or may prove, efficient to diminish disease and to stamp out pestilences; and they will continue to reject all unproved methods which require them to abandon *those* methods proved to be even temporarily advantageous.

From all which precedes, the following conclusions are drawn; The pro-

gressive amelioration of insanitary evils is well proved, and amply suffices to explain the progressive amelioration of virulent diseases, without taxing for explanation such unproved causes as attenuation of their viri and as heredity, both of which alleged causes fail to this day to manifest the alleged favorable results whenever these diseases are subjected to the same grossly insanitary conditions which in the past so intensified their evil results.[1] No man can yet prove that endemic virulent diseases must exist, any more than he can prove that dry rot, potato-rot, ergot, lice, mosquitoes, the cotton-worm, the itch-mite, tape-worm, etc., cannot be exterminated. No man can yet claim that the causes of measles, scarlet fever, etc., are "out of our reach;" that adequate efforts have ever been made to stamp them out; and that mankind is, and always will be, incapable to make the necessary efforts. No man can present any thing like adequate evidence to prove that the injury to mankind would be greater, if measles, etc., recurred after having been banished for any given number of years, than if they prevailed continuously to said date; it being admitted, of course, that the injury would be much more striking in the former case, even if not so great as in the latter. No man has yet proved that endemo-epidemic virulent diseases more especially "single out the low-spirited, intemperate, the debilitated," — in fine, those too ill organized to propagate a vigorous race, — any more especially than cold, heat, conflagrations, storms, floods, famine, etc., show a like preference for weeding them out. No one can prove that men are not as well justified in efforts to restrict the former as the latter; and very certainly no one can prove that nature is *so malevolent* that ample and more efficient means than epidemics have not been provided to secure the survival of the fittest; beneficent means sparing, in much greater number, those *fit*, while weeding out those *unfit*, to survive.

Until these various propositions shall be disproved, sanitarians will refuse to indorse conclusions derived from such improbable and unproved premises as spontaneous generation, as a disease-force, as the attenuation of virulent viri by spreading them, and as the hereditary resistance to such viri. Even the "ordinary average sanitarian," so much disparaged, will prefer to remain in the dark valley of active experimental efforts rather than risk the danger of incurring a paralytic vertigo in striving to mount to "the broad level" of such science and of such philosophy.

[1] Dr. Lyman is the suggester of the following syllogism: Measles, because it had never before prevailed among them, destroyed one in every ten of the total population of the Sandwich Islands. Therefore (!) measles, long endemic in the United States, thereby furnishing its citizens good opportunity to acquire hereditary resistance to it, destroyed in 1862–63 even more United States soldiers than it had Sandwich Islanders. This *non sequitur*, which rebuts his theory, he explains by stating that these soldiers were subjected to unusually unfavorable sanitary conditions, — such as were, no doubt, usual with the Sandwich Islanders; and thus his last admission supports that conclusion which rejects his hereditary tolerance and his attenuation of viri by their prevalence. However, if his conclusion is illogical, his premises are not less imperfect, provided that the official reports of the United States army are correct; for these state that only one soldier, out of about every sixteen *of those attacked*, died with measles. The suspicion is justifiable that the statement he makes about the Sandwich Islanders also requires an official report for its credence.

Finally, even at the time when Spencer violently opposed the ordinary methods of sanitarians, he eloquently urges all men, as is now urged on those members of this Association who have a "healthy faith" in man's power to stamp out eventually such diseases as measles, scarlet fever, etc., that they can in no way so well hasten human progress, illustrate the law of evolution, and obey the law of God, as by strict fidelity to conscience, — that conscience which incites them to take part in every rational effort to accomplish their divine purpose. Spencer — who has cause to exclaim, "Defend me from my friends! I can defend myself from my enemies" — strenuously insists, that, by thus acting, you will best perform your part in evolution, whether you fail or succeed in your conscientious efforts.

XXV.

WHAT THE STATE OWES THE PEOPLE.

By Hon. ERASTUS BROOKS
Of New York.

That "the world is governed too much," is a maxim that may wisely be accepted by both the people and the government; and especially is the maxim true in a republic like our own, where the people, when notified of their duty, are reasonably considerate and intelligent. The Declaration of Independence, the Constitution of the United States, and the constitutions of the several States, all begin with some reference to the peoples' rights and welfare. The great object of government is the diffusion of knowledge, and the enactment of laws for the regulation of States, communities, and persons; and among the first of these duties are provisions of law for the safety of the people. To secure "life, liberty, and the pursuit of happiness," is a principle of government older than the Constitution; and as such it was embodied in the first record of our national existence. It is safe, therefore, to say in the beginning of what we have to present to the American Public Health Association, that there can be no real life or happiness where the public health is not provided for by law; and that the State is only in the discharge of one of its first duties when it seeks, under reasonable laws, to maintain the chief end of its existence.

In the Congress of the United States, and in the legislatures of the several States and Territories, it is exceptional to find members of the medical profession. Here and there, it is also true, only are found men who unite an interest in the political and physical welfare of the State. In a certain way we all seek that "good digestion which waits on appetite," looking for "health on both." But far more than in what we eat and drink, and put on and off, we digest our words and thoughts. Our laws are digested, and have been from the order of the Roman Emperor Justinian (now nearly fourteen hundred years since) to the present time. In food for the body, as in light and air for the abodes of men, the work to be done is to arrange, classify, dissolve, and distribute whatever in the one case is nutritious from whatever is otherwise, and in preparing, if I am correct, whatever is put into the stomach for conversion into blood and into chyle or chyme; and in the other case the work to be done is to arrange, classify, work over, and distribute, for the use of others, whatever is necessary in books and letters for the instruction of mankind.

For more than forty-five years of my life, as proprietor, editor, and legis-

lator, I have been engaged in the second class of this kind of work. To most of you belongs the more important work, which may be presented in the three aspects of reducing the mortality among the people at large, of saving the people from physical pain, and of curing the sick. If to do all this is not to make "a voyage of discovery" and "a circumnavigation of charity," then no such voyage can be taken in the journey of life. I can recall no work of equal value, nor any kind of labor calculated to promote so much human happiness.

In political governments the people are bound to seek and to enjoy, if they can, their political preferences for principles and for persons. Whether in majorities or minorities, one side will govern and the other side will obey. The two sides are essential to the welfare of the State; but, while this is true, there are, in all States and communities, unities and necessities still more essential for the public good, and upon which there can be no safe divisions of opinion as to the proper uses of the authority of the State. We may have diversities of opinion as to the causes of disease, remedies for their cure, as to climates and exposures, as to habits of living, the safety of buildings, the best methods of drainage, sewage, and ventilation in dwellings and workshops: but science and experience will in time solve all these differences into one practice or system; while in all that belongs to duty to be performed, or to culpability for neglect of duty commanded to be done, in questions relating to the public health, there can safely be no divided counsels.

I place the subject of health as among the first, if not the very first, in the science of political economy. It is a question which belongs to the wealth of the nation and to the prosperity of the people. The man or scientist who is capable of discovering or curing disease, and whom by custom we define as a physician, is, in the established meaning of words, an experimentalist in physics, and a natural philosopher. The doctor, in brief, is a person recognized, in law and practice, as one skilled in the art of healing the sick through the agency of proper medicines; and it is this healing of disease in its effect upon communities which covers and governs a material fact in political economy.

We know what ravages yellow fever has produced in this country and in the world, how many lives it has destroyed, how much misery it has produced and distributed, and how much wealth it has diminished. The lessening or removal of the prevalence of this great calamity has been partly the work of physicians, and a large share of it belongs to the nursing of liberal and intelligent men and women. This work, often a volunteer service, was inspired by the noblest motives, and has again and again, and especially in this section of the country, produced the grandest results.

The State politically, but not in the sense of party politics, and the people personally, — in every sense, I need not say, — have the deepest interest in what is called State preventive medicine. Disease among a large class is often but another name for poverty, pauperism, orphanage, and bankruptcy. In Philadelphia in 1871–72 some forty-five hundred people perished from small-pox.

The reported loss in business there at the time, and from this disease, was sixteen million dollars, besides a cash-value in human lives of five million dollars more. New York City was also a great sufferer at the same time and from the same cause; while Baltimore, Boston, and Providence, and other cities, resisted the disease and prospered greatly, owing to a timely and thorough vaccination of the inhabitants.

The State imposes certain qualifications not only upon dealers in drugs, but upon physicians, before they can practise in the great art of prescribing suitable remedies for disease. A more important State duty is the enactment of wholesome laws to prevent disease. This is done without infringing upon the personal or political rights of any citizen.

The first duty is to remove the cause of all pestilences and epidemics, foreign or domestic; and, where these unfortunately prevail, the second duty is, by vigorous administrations of proper laws, to prevent their spread and put an end to their existence. When the pleuro-pneumonia came into the United States from Holland, — once the great depot of this disease in Europe, — and when, to an alarming extent, it was carried into England, the realm, the State, and the Federal Governments did not hesitate to act forcibly and promptly for its removal. Holland, profiting by experience and energy, reduced by inoculation the disease to one or two per cent, and finally stamped it out. If Massachusetts and other States have accomplished a great work in preventing the lung-plague in cattle, what ought not all the States to do in preventing even a worse disease in men, women, and children? To a woman of Massachusetts is due the honor of suggesting the first board of health in the United States. A decent care for the people by the State, and a decent respect for the government by the people, establishes reciprocal relations which no party can neglect. The lives, health, and happiness of all classes of citizens depend upon these mutual observances of duty; and hence the existence of State boards of health, all created by law to present, discuss, and enforce obedience to the laws passed. The law, in all its provisions, is for the common good. It is a simple application of the science of medicine in the form of remedies or preventions to the people of the State. It teaches mankind not only the inestimable blessings of light and air and water, of ventilation and drainage in dwellings and places of business, but the absolute need of the best use of these great gifts in nature, chemistry, and discovery.

It is demonstrated in the city from whence I come, by the president of the city board of health, that thousands of young lives have been saved yearly for ten years and more by the enforcement of health laws passed by the State. Recent laws relating to the tenement-houses will impart great comfort to their poor occupants, and add largely to the number of lives saved. The death-rate of the city now numbers between twenty thousand and thirty thousand each year; and one-third of this number of lives could be saved if the health laws could be enforced. Eminent physicians, verbally and in their written reports, assure me that one-third or more of the prevailing sickness in town and country could be prevented by the observance of sanitary laws. Mr.

Edwin Chadwick stated three years ago, to the British Scientific Association, that both the sick and death rate had been reduced one-third by the practice of sanitary laws, and that the death-rate in the old districts had come down to sixteen or seventeen in each thousand deaths; and he declares that in new districts, with no overcrowding and with a proper supply of water and surface cleansing, that the death-rate can be reduced to ten in the thousand, which is nearly two-thirds less than the mean death-rate among the general people.

More remarkable than even this encouraging promise, but resting upon the common-sense rules of fidelity in public service, — and adding, perhaps, a becoming sympathetic interest in the happiness of mankind, — is the statement, that, in well-governed institutions for children between the ages of three and fifteen years, the death-rate can be reduced to two-thirds of the number generally prevalent, or to three in each thousand children, and with a corresponding immunity from all common epidemics. Even in the British reformatory prisons, by the careful use of preventive medicines, the death-rate has been reduced to three in the thousand, with a general exemption from diarrhœa, dysentery, typhus fever, and eruptive diseases. The diseases belonging to the respiratory organs are also reduced by care to one-half.

The cholera epidemic, which prevailed in England in 1832, frightened the people there into the necessity of securing more of the decencies of life than had before been enjoyed. The panic of a scourge, like most other panics, prompted many of the people to put on their thinking caps; and from the consequences of the cholera came in the course of ten, twelve, and fifteen years, valuable government reports and laws. These laws, if Dr. Bowditch be correct, are in advance of the laws of all other countries; and one man, Dr. Farr, has been the bright, particular star in this work of sanitary reform, not only for Great Britain, but in many other parts of the world. If disease spreads by contagion, so also good example and benevolence inspire imitation and secure their reward. The great pioneers of the world in discovery and work have proved its greatest benefactors; and to the good beginnings at home and abroad we owe to-day the existence of twenty-four State boards of health in the thirty-eight States of the Union, and all these have been established within twenty years. Lord Beaconsfield spoke the truth for his own country when he said, as prime minister of England, three years since, that "the health of the people is the first duty of the statesman." This sentiment is at least equally true in a country of such enormous proportions as our own, and daily increasing, not only from its own inherent growth, but as the destined home of so many millions of people in the Old World.

The government and the States are not asked for what so often excites and thrills the body politic by the possession of place, patronage, and power, but simply to engage in the paternal works of saving the lives and promoting the health of the people. The appeal is to the common sense and practical humanity of members of Congress and of the legislatures of the States, some of whom, as in Mississippi, Alabama, and Texas, have already performed a work of moral and social importance, not only to the people of their own

States, but in the way of example to all non-acting States. The motives for the needed work are the highest of our best natures, "since the greatest good of the greatest number of the people" is all that is asked.

If, when governed by such considerations, the people refuse to act, the law here, as abroad, must take its course, and penalties be imposed for its violation. Nor is it enough, as expressed a hundred years ago and more by Edmund Burke, that "men *mean* well. It becomes them to DO well." You are asking nothing new of States. Centuries ago the republics of Greece and Rome had their sanitary laws; and the argument then, as to-day, as a part of the important work of the period, was, that physical culture would secure physical health. The old Romans had their systems of ventilation, drainage, and sewerage, their splendid aqueducts, baths, and pavements; and all of them promoted the comfort, convenience, and health of the people. Sanitary law also was a part of the Mosaic law, and in practice better at times than the customs in very many of our own American towns and cities in the closing years of the nineteenth century of the Christian Era.

Among the lost arts and blessings of mankind, unfortunately, were the lost codes of laws relating, among other things, to the public health. The code of Justinian and the laws of Lycurgus, with laws for justice and health, went into decay; and, for a thousand years and more, books and learning, and in a certain sense deeds of practical charity, were confined to the monks. It was long a forgotten lesson among the general teaching, that "cleanliness was next to godliness," and therefore a very close neighbor to all kinds of practical piety. Hence, and clear up to and far into this nineteenth century, came agues, malaria, small-pox, cholera, scurvy, plagues, and pestilences, and all the inherited ills of life to which, from negligence and ignorance, flesh and blood are exposed. Happily for the world, public opinion is now aroused in the interest of the public health; and the subject reaches us to-day in the threefold form of economy, thrift, and morals.

If, as alleged by way of criticism, the health service is costly, it can be proved to be the best possible investment to meet the cost. We begin in the New York State board this year with an appropriation of $15,000, and it may be more or less hereafter. The city board of New York asks for the year 1881 the sum of $236,000; and it is money so well invested, that, in buildings, institutions, in saving health and lives, it will save more money to the city in income and taxes than any investment of the most skilful financier in Wall Street. If to this result the money-value of life is counted, the five or six thousand lives yearly saved will run into some millions of dollars. In Great Britain they place this kind of value upon human existence, just as we say in the United States that the cash-value of every able-bodied immigrant from the Old World is $1,000. There Dr. Farr — perhaps the highest authority in the Old World — placed in his reports, as the registrar-general of the government, the money-value of each man, woman, and child in the United Kingdom at $795. The neglected preventable deaths in England and Wales during the school period, apart from infant mortality, makes a loss to the State

of $95,000,000! The British life-insurance companies and friendly societies also give the money-value of work lost by sickness. For every death there were, as proved on careful investigations by the government, two persons always sick and disabled, thus making a loss for each death of 730 days in each year. This result is reached by placing the minimum of the entire population at the sum of $795 here named, and to these figures are added 50,000 lives lost annually in the school age in England and Wales, which might be saved. But such statistics are exhaustless, and I must soon leave them for more practical conclusions.

In considering the subject of State law and personal work, it will be wise to recognize the principle in regard to disease — especially is this true in cases of quarantine — that it is not places, but *principles*, which secure public health. This rule applies alike to the ship, the shop, and the home. Ship-fever, under proper treatment and practice, has become what Dr. Vanderpoel has called almost a mythical disease; and by simple cleanliness it is now easily mastered.

Cholera, though not mastered by being stamped out in the same way, is often under control; and its spread into towns and States, and along the coasts and rivers, can be prevented. It always comes from importation. Importation, if need be, can be forbidden; and by law and care its spread, if it should come, can be prevented. When, in 1832, 1848–49, 1854, 1865–66, it entered the United States and Canada, it travelled as fast as travellers could be borne by steam to the far West, and left its footsteps of sorrow all along the road from New York and Quebec. So also in 1848 it entered New Orleans from Havre, and forced its way all along the Mississippi, reaching towns and cities a thousand miles apart; and, surviving the winter, it pursued its ravages over land and water in 1849–50. Had the United States, or Louisiana alone, possessed powers given them under existing laws, no such disaster could have occurred.

Sanitary laws properly executed, I need not say in this place, have prevented and can prevent the spread of cholera. The law, however, must be supreme, and not only supreme, but cover districts, precincts, towns, counties, States, and governments, even to the interposition of international authority. There must be the *cordon sanitaire*, as along the vast frontiers of Russia, and maritime law in the hands of faithful officials; and these officials must be sanitary officers, as we have seen them upon the Red Sea and the Mediterranean, at Medina and Mecca, keeping back and pushing forward the hundreds of thousands of Mussulman pioneers, who, but for the law and its vigilant observance, would bear disease and death wherever their footprints are found.

What John Stuart Mill calls "the limits of the province of government," we must agree, whether spoken of the State or of the citizen, excludes no good work. It may and should exclude all those needless forms of non-intercourse common to the Middle Ages and to later periods of time, and all oppressive methods of administration, as when petty despots govern the people; but

whatever is needed for the absolute good of the people in establishing and maintaining the public health must be done. If the law is a bad one, repeal it because it is a bad law, or amend it until it becomes wise and timely. In New York we have a compulsory law requiring vaccination; but it is a dead letter, except in a single city: and vaccination is generally reduced to deeds of charity, or to simple individual volition, even when the public welfare requires obedience to the public statute. It is the cost to the State that some people complain of; but, as a question of State economy, I hope I have removed this objection. The real State cost in all the United States at present is less than $5,000 for each million of inhabitants, and the saving covers the cost ten times over. The civil war destroyed 600,000 persons. Sickness wastes more than war, — 20,000 a year in London, and 120,000 in the United Kingdom. And, if recorded figures from medical men are true, 700,000 years of individual human life are yearly lost by preventable neglect among the 5,000,000 of people in the State of New York, and from 50,000 to 70,000 years of human life are also wasted every year there by sickness; and New York is no worse off than other States of the Union. This estimate is based upon the fact that the average length of these lives fall short ten years each of what they should be. So in England, also, we read the important truth, that in the healthy districts of the kingdom persons who reach the age of twenty years pass on to the good old age of threescore and three years and nearly a half; while in the general districts death comes within forty-five years. The annual money-loss of this single death-record, coming from ignorance, neglect, and crime, is stated at nearly $50,000,000, besides the loss from impairment of health and from poverty among those not positively dead.

When it is known that in small-pox isolation and vaccination provide a certain cure for a loathsome disease, the existence of which is concealed where it notoriously is, the law or its officers are at fault. When it is also known that bad air produces bodily and mental disease, and that proper ventilation, heating, and water-supply are remedial measures, it is the duty of the law put in practice to point out and remove the evil. The law in some of our cities at least prescribes where houses shall be built of brick or stone only; and, if it is a wise law, may not the construction and drainage of dwellings and workshops also be regulated by law? Mr. Edwin Chadwick says, that, by following out a correct principle, three houses may be well drained at the present cost of one; and Mr. Edward Atkinson, also good authority, declares that unsafe buildings cost more to construct than fire-proof buildings. It is proposed in England to guarantee dwellings as safe to live in on the score of health, and simply by evidences of proper construction and drainage. When sewer-gas poisons the blood, and produces dysentery and malaria in other forms, who shall condemn any proper law intended to prevent poison and self-inflicted murder? So in regard to adulterations of food. Take, for example, the simple article of candy, much of which is reported to be made from grape-sugar, glucose, and terra alba, the latter

being sold at one cent a pound, and the former at four cents a pound, where granulated sugar costs by the barrel ten and a half cents: the cheaper candy may be impaired by impurities from fifty to seventy per cent. It is a public duty to resist all impurities, both in the food we eat and in the contaminated air we breathe, — in all dwellings and all workshops, and in all that is around them. And let me say, in speaking alike for the State and citizen, that *obsta principiis* is the only safe rule of action.

This subject addresses itself to the hearts, minds, and bodies and estates of every man and woman in the land. The real wealth of a nation is counted, not in mines of gold, silver, and coal, nor in the more useful metals of iron, lead, copper, and tin; nor yet in the millions of acres of land cultivated by between five and six millions of our people; nor in the work produced by half this number of persons employed in the manufactories and workshops of the people; nor yet alone in the treasures brought up from the depths of the sea, or borne upon the two oceans which surround us; nor from or upon our grand lakes and large or limited rivers. These are vast, grand, and stupendous sources of material wealth and of physical greatness. But, as far above them all as the heavens are from the earth, as a simple question of value, is the general health of the people. Here alone are true manhood, real civilization, contentment in life, peace and rest in the family, pervading happiness, and substantial good-will among men. Here alone the personal man is the temple of the undying soul, and only the purified abodes of men are fitting habitations for this vital principle.

We sum up, in conclusion, the duties of the Federal Government and of the State, in the following order: —

First, Supervision over the health of the entire people, — peaceably if it can be done, forcibly if necessary. Where the Federal Government has authority, — as upon the sea, lakes, rivers, over forts and arsenals, over the army and navy, in the legislation for commerce, international and internal, especially in regard to infected vessels, over animals exported and imported, — this authority belongs to Congress. It has been proved, I think, after the most laborious investigations for nearly two centuries past in this country, that the epidemics appearing among us have been traced to importations. If epidemics in this and other Gulf cities seem to disprove this fact, the seeming exception is due to the bad sanitary condition of the localities named, or to the fact, as stated by Dr. Vanderpoel, to the germs of disease concealed and dormant in some cellar or room not reached by the purifying air of heaven in the place where the disease exists. The port of New York, for four months of the year, has been as much exposed as New Orleans to yellow fever; and it has been kept away from New York, not by any system of non-intercourse, but simply by the practice of correct principles of quarantine by vigilant and capable officers of the State.

Second, State governments are clothed with power over the health of the people within the commonwealth, and over all the territory where the Federal Government is without jurisdiction. The colleges and schools of the State, its

institutions of charity and learning, its prisons and reformatories, its codes and laws, all that belongs to roads, avenues, parks, canals, docks, piers, and even to public and private dwellings, when legislation is needed for health, belong to the parental care of the State. Epidemics are to be treated like public enemies; and often they are worse than armed foes, because more insidious, and beyond observation. They come in foul sewerage, polluted streams, and corrupted wells of water. They come also like a thief in the night, and steal away those jewels of the household, the little ones, whose lives are more precious than all the wealth of the State. To prevent adulterations in food and drugs — not practised, I hope and believe, to the extent reported or suspected — is another of the State duties. To clothe boards of supervisors and trustees in towns and villages, and mayors, common councils, and health boards in cities, not only with ample power in regard to health, but to require them to pass and enforce ordinances, is a positive duty of the State. A State department of health is essential to secure these results; and in its action it must be impartial; effective, vigorous, determined, and take no step backward.

Third, While Federal and State governments are bound to do what is here suggested, a higher law or duty rests upon the women of the household and upon faithful men of business. When a woman suggested the first board of health in the States, the appeal only came when a typhoid fever was discovered in a seminary of learning at Pittsfield. The State cannot secure obedience to law without the sympathy and co-operation of the people. Light and air, cleanliness and order, are the great preservers of health; and the wives, mothers, and daughters, as the necessary mistresses of our dwellings, can best serve the State when they secure the greatest possible health in their own homes. Dr. Farr prescribes the right remedy when he says that "health at home is health everywhere," and when he adds, as his conclusion from experience, "that the whole future sanitary movement rests for permanent and executive support on the women of the country." If it be true, as stated by the president of the State Board of Health for Connecticut, that "the predisposing causes of insanity in the United States can be traced to malign influence on childhood," no wonder that we have from Dr. Wilbur of New York the startling record that there are fifty thousand lunatics in the country; nor that we are behind England, Germany, and the age in which we live, in our treatment of this class of unfortunate people.

Finally, a word as to quarantine. Commerce cannot be forbidden; but it may be regulated when hurtful to health. At best, however, State law is only a relative guaranty of the public safety. Quarantine and commerce are naturally enemies; and the State must regulate the relation between the two, the State always insisting, that, as far as possible, the public health within its borders shall be permanent. Every nation and every state has the right to use intelligent ways and means to preserve health over all its borders; and the Federal Government also has rights which must be respected, and laws which must be obeyed. There are natural, legal, wise, and conservative divisions

between nations, states, municipalities, and towns. Where the death-rate in England is 19.9 in the thousand, in Austria 31.3, and close on to the latter number in all parts of Italy, official action is demanded in the name of public safety.

Drawing, then, only the proper lines between nations, states, and local authorities, as a question of commerce, all in established authority may, under the administration of wise laws, be able to say to Congress for all rivers passing between different States, and for all lakes bordering upon these States, and for the great highways on the ocean touching our American land, —

> "Bid harbors open, public ways extend;
> Bid temples worthy of the gods ascend;
> Bid the broad arch the roaring flood contain,
> The mole extended break the roaring main;
> Back to her bounds the subject sea command,
> And roll obedient rivers through the land."

XXVI.

ON "TENEMENT-HOUSE REFORM IN THE CITY OF NEW YORK."

By JAMES GALLATIN, Esq.,
President Sanitary Reform Society of New York.

It is some forty years since the first tenement-house was erected in the city of New York. It would be a painful task, but one most interesting and instructive, to look back through these years, and study the causes that have given rise to the terrible evils of the tenement-house system, — a system that has given name to a disease, "the tenement-house rot." But such an inquiry would fall outside of the boundary lines of this paper, which has been prepared for the purpose of placing upon record an account of the recent tenement-house reform movement, and the results that have flowed from it. We may, however, glance for a moment back to the year 1864, when the Council of Hygiene of the Citizens' Association made a thorough sanitary inspection of the city, and in the following year published a very full and admirable report of the results of their labors. The startling disclosures of this report so aroused public opinion, that a law was passed by the Legislature, in 1866, creating a Metropolitan Board of Health, with very extensive powers. Since that day the work of sanitary reform has been carried on with more or less success. The improvement in the healthfulness of the homes of the poor was, however, more brought about by the abatement of surrounding nuisances — such as fat-boiling establishments, slaughter-houses, and the like — than by any radical improvements in the condition of the old houses or the construction of the new. In fact, nothing whatever was done to regulate the construction of new tenement-houses until August, 1878, just before the inauguration of the present reform movement. Want of space forbids our dwelling upon the work of the Board of Health during these years, — a work, moreover, which is more or less familiar to all sanitarians from the perusal of the admirable series of annual reports. Suffice it to say, that the very marked decrease in the death-rate is a sufficient witness to the wisdom of the laws, and the faithfulness and ability of those upon whom have devolved their execution. We come now to the fall of 1878, when the Association for Improving the Condition of the Poor, and the State Charities Aid Association, two well-known benevolent societies in the city of New York, undertook to make special investigations into the condition of the tenement-houses, and discovered a most distressing and alarming state of facts. At the same time the sanitary engineer offered premiums for the best designs for a tenement-house, to be built on an ordi-

nary city lot, twenty-five feet in width by one hundred in depth. Plans and specifications to the number of one hundred and ninety were received; and, after being examined by a committee appointed for the purpose, premiums were awarded to the successful contestants at a public meeting held at the Cooper Union. This proved to be a most valuable aid to the cause of reform, inasmuch as many skilful architects gave much attention to the subject of tenement-house construction, and thereby helped greatly to bring about intelligent legislation on the subject.

A meeting was held on Feb. 4, 1879, at which over fifty of the clergy, besides a number of other gentlemen, were present to discuss and decide what practical steps were to be taken to meet the evils complained of. On Sunday morning, Feb. 23, sermons were delivered in many of the churches, in which tenement-house reform was urged upon the hearts and consciences of the congregations as a matter of religious duty. On the evening of the same day crowded meetings were held in two of the largest churches, which were addressed by many eminent clergymen, sanitarians, and philanthropists. On the following Friday, Feb. 28, a mass-meeting was held in the great hall of the Cooper Union, presided over by the mayor. The platform was occupied by many of the most influential citizens, and much interest was awakened among the crowded audience by the eloquent speeches of the distinguished gentlemen who addressed them. At this meeting the following resolution was adopted: —

Resolved, That the mayor be requested to appoint a committee of nine for the purpose of devising measures to carry tenement-house reform into effect, such committee to have power to add to their number.

The committee at once organized by the election of the usual officers and the appointment of sub-committees, the principal ones being on legislation and on the formation of a building association.

The sub-committee on legislation at once put itself into communication with the Commissioners of Health, and proceeded to study the laws affecting tenement-houses, as they then stood, in order to ascertain in what respects they were defective, and what was wanting to render the health department more efficient. It was found that a "Tenement-House Act" had been passed in 1867, under the provisions of which the Board of Health had been able to accomplish many valuable results; but it seemed to be defective in the following particulars, which defects were cured by the amendments subsequently enacted: —

1. In many cases where tenement-houses were to be erected, it did not prevent the covering of the whole lot by the building. This was remedied by requiring that a clear, open space, of not less than ten feet, should be left between the building and the rear line of the lot, and by authorizing the Board of Health to restrict the proportion of lot to be covered to sixty-five per centum, whenever they deemed it advisable, except in the case of corner lots.

2. It did not secure a reasonable amount of light and ventilation to the inside rooms of new houses. The amended Act requires that every sleeping-room "shall have at least one window, with a movable sash having an opening of not less than twelve square feet, admitting light and air directly from the public street or yard of the said house, unless sufficient light and ventilation shall be otherwise provided, in a manner and on a plan approved by the Board of Health." The Board are now approving plans where the inside rooms open upon shafts of the following dimensions: For houses not more than three stories in height, twelve square feet; not more than four stories, sixteen square feet; not more than five stories, twenty square feet. These shafts, if properly constructed and properly used, supply perhaps as much light and air as it is practicable to compel landlords to provide for their tenants in a crowded city. It is my opinion that they should be arranged in such a way as to bring down fresh air and distribute it to the rooms that open upon them, instead of permitting the foul air to escape into them. This can be accomplished by using a double flue for the cooking-stove to be found in each apartment, — one section of the flue conveying the smoke; the other, owing to its being thoroughly heated, acting very efficiently as an exhaust ventilator. The air and light shaft should then, if built of brick, be left open at the top; if constructed of lath and plaster, be so covered over as not to prevent the admission of a full supply of air. This scheme seems to me to present the following advantages: It supplies the pure air to be found above the houses, instead of air tainted by dirty streets and close back-yards, such as is admitted by the doors and windows of the lower floors; it checks the distribution of disease by seeking to prevent the admission of contaminated air to a shaft used in common by a number of families; and it utilizes for ventilating purposes to very great advantage the motive power of the large number of fires almost always in use in a tenement-house. Of course, various causes — such as changes in the temperature, in the direction and velocity of the wind, the presence of cross-currents, owing to the opening of windows in the front and back of the same floor, and the establishment of an up-and-down current at the same time in the shaft — may interfere with securing the best results; but I think that most of the time the system will prove satisfactory.

3. Nothing was said about overcrowding. The Board are now authorized to require an owner to reduce the number of occupants of any tenement-house that they consider to be overcrowded, until a minimum of six hundred cubic feet of air-space is secured to each tenant.

4. The amended law also permits the Board of Health to require the presence of a responsible person, either the owner or a janitor or housekeeper, in every tenement-house occupied by more than ten families.

For a number of years the Board of Health had been very much assisted in their work by the co-operation of the sanitary company of police. In 1876 they were deprived of their services, and the committee found that the department was much crippled in its usefulness thereby. A provision was incorporated into the new law, which has secured to the Board the services of

thirty experienced police officers. The result of this has been, that, during the first year of its re-establishment, the company has made over a hundred and fifty thousand inspections, and has produced a very marked change for the better in the tenement-house districts.

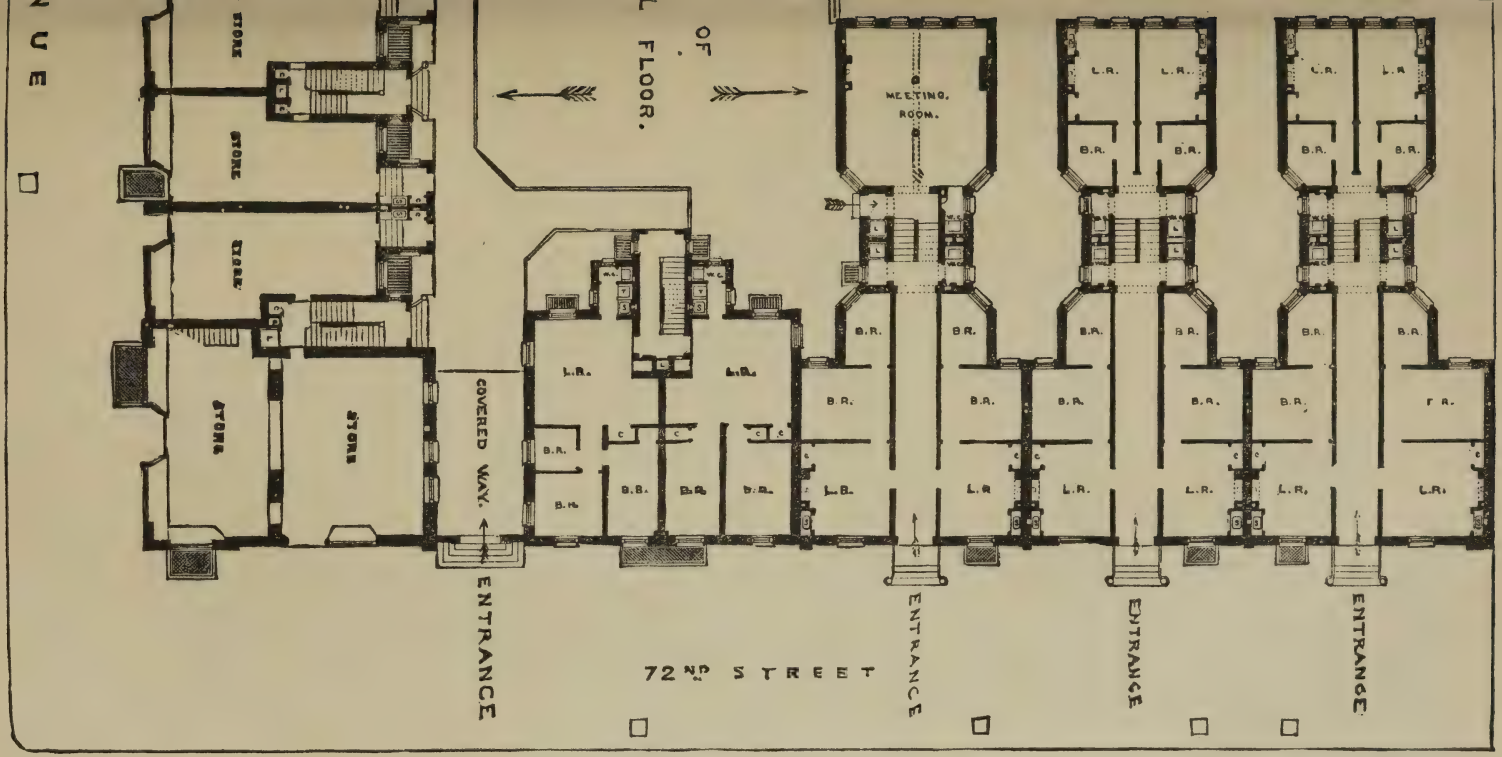
The law, as originally introduced into the Legislature and passed by the Senate, provided that every tenement and lodging house must be licensed, and pay an annual fee of three dollars on each house. It was thought that this would tend to give the Board of Health a more direct control over the sanitary condition of the houses, and would also furnish a considerable sum of money to enable them to greatly amplify their work. This section of the law failed to pass; but, so far as it would have supplied increased means, the end has been accomplished by the substitution of an amendment which establishes a "tenement-house fund" of ten thousand dollars per annum, to be expended in the discretion of the Board of Health, and through the willing co-operation of the city authorities, who have supplied means to pay for the sanitary police, and for certain additional inspectors and clerks that were thought necessary, so that the gross amount of additional moneys secured to the board has been almost exactly equal to that which would have been obtained from the license fee of three dollars on each of the 21,163 tenement and lodging houses in the city of New York.

At the end of March the bill, as approved by the health commissioners and adopted by the committee of nine, was introduced into the Legislature, and then followed two months of vexatious delays, owing to the vigorous opposition of many of the landlords through the agency of their representatives at Albany. The last days of the session drew near, and it seemed as though all was lost; but the powerful aid of the New York press was invoked, and, under divine Providence, it was owing to it that the bill was finally carried through both Houses on the last day of the session, with but two votes against it in the House and one in the Senate. On the 16th of June, 1879, it was signed by the governor; and a measure which was destined to ward off from many a humble home the dread presence of disease and death became law.

We turn now to the labors of the other sub-committee, charged with the duty of bringing about the organization of a building association.

Subscription lists were circulated privately; and during the summer of 1879 the "Improved Dwellings Association" was incorporated under the laws of the State of New York, with a capital of three hundred thousand dollars. The following winter was spent in studying various plans sent in by a number of architects who had been invited to submit them to a committee appointed to examine them. In the spring of this year a piece of property was purchased, situated on Seventy-first and Seventy-second Streets and First Avenue, and in August the work was commenced. The buildings are in course of erection on a plat of ground two hundred and five feet on the avenue, and two hundred feet on either street. The frontage on the avenue is to be occupied by a block six stories in height, designed somewhat on the English model, being only two rooms deep, with small extensions for the water-works.

BOUNDARY - L
LAUNDRY.
PLAN OF 6TH FLOOR.
LAUNDRY.
YARD
CENTRE LINE
PLAN OF
2ND — 3RD — 4TH
AND 5TH FLOORS
CENTRE LINE
SCALE OF FEET
71ST STREET
FIRST - A



PLAN OF BUILDINGS-IN COURSE OF ERECTION-ON 71ST AND 72ND STS AND 1ST AVE.—NEW-YORK.—
FOR-THE IMPROVED DWELLINGS ASSOCIATION — VAUX & RADFORD ARCH'TS. 1880.

GENERAL VIEW OF BUILDINGS being erected on 71st and 72d Sts. and 1st Av., New York, for THE IMPROVED DWELLINGS ASSOCIATION — Vaux & Radford, Arch'ts.

There are to be five houses; the corner houses to accommodate three families on a floor, the inside houses two families on a floor. Each apartment will consist of a living-room, two bedrooms, and an extension containing a water-closet, wash-tub, sink, and ash-shoot. The first floor will be used for stores. The staircases will be fireproof, at the rear of the houses, and approached by a covered way running the whole length of the block, with entrances at both ends on Seventy-first and Seventy-second Streets. On each of these streets an opening is left of about thirteen feet immediately in the rear of the avenue buildings and over the entrance-doors of the corridor, in order not to block up the rear windows, and also to admit air to the interior of the block. Back of this opening on either street is to be a house similar to those on the avenue, each floor to consist of one three-room apartment and one four-room apartment. This brings us about a hundred feet down the side streets, and completes the structures on the avenue lots. So far the problem of how to build tenement-houses that should be healthful, and at the same time in an economical manner, was comparatively easy to solve; but when it came to building on inside lots, where the advantage of corner lots was wanting, the difficulties became much greater. The following considerations will make this clear: Given a whole avenue frontage of eight lots of twenty-five feet in width and a hundred feet in depth, a plat altogether of two hundred by a hundred feet, we have a total street frontage of four hundred feet to furnish us with light and air; but the adjacent plat of the same size will have a hundred feet on each street only, a total of but two hundred feet, — just one-half as much as the avenue front. If these side-street houses were built only two rooms deep, the amount of ground left uncovered would be so great that the rents would necessarily be forced up to a point far beyond the means of those for whose benefit they are designed. It was then absolutely necessary to build back on the rear of the side lots, and thus cause some of the families to live upon the yard. The problem then was to furnish these families with a sufficiency of light and air, and at the same time not allow their apartments to block up the windows of those living in front; and it was very happily solved in the following manner: Three houses, six stories high, are to be built on the hundred-feet frontage of each side street, making each house about thirty-three feet wide; and then in the rear are to be placed three houses twenty-four feet wide. Each rear house is to be tied to its front neighbor by a narrow staircase-well; thus, in fact, making one house of the pair. The front houses are to be contiguous; but the rear houses, being narrower, will not touch each other, but will afford a passage-way some nine feet in width to furnish air and light to what would otherwise be inside rooms. A dumb-bell, with one ball smaller than the other, will convey some idea of the shape of the houses. Each floor of the front part will consist of two apartments, — one of four rooms, the other of three; whilst the rear will provide two of two rooms each. Unlike the avenue houses, each family will not be supplied with separate plumbing arrangement, but only with a sink. Two water-closets, one for each two families, will be on each floor, adjacent to the staircase; and laundries will be

arranged for the tenants to use in common. All the houses will contain lifts to elevate coal, etc. Great attention has been paid to the plumbing and drainage; a steam-engine being used to fill cisterns on top of the houses, in order to furnish an abundant supply of water, the scarcity of which in the tenement-houses of New York being one of the greatest evils that the poor have to suffer from. To sum up: There will be fifty-eight apartments of four rooms each, ninety-eight of three rooms, and sixty-two of two rooms, — two hundred and eighteen in all, affording comfortable and healthful homes to nearly a thousand persons. The first floor of the avenue houses will be rented as stores. The dividends are to be limited to five per cent, any surplus to be invested in additional buildings. The total cost of ground and houses will be about two hundred and forty thousand dollars.

We must turn aside for a moment to note with pleasure the great success with which the work so admirably inaugurated and carried out in London by Miss Octavia Hill has been imitated in New York. Her plan, as you will doubtless recollect, consists in hiring from the owner various pieces of dilapidated tenement property, occupied by a very poor, miserable sort of people; and, after thoroughly cleansing and repairing the premises, they are then let to these same people as far as possible, at a fair rental, the prompt payment of which is insisted upon, and the tenants are further expected to comply with a code of sanitary regulations. Miss Hill becomes personally acquainted with all the tenants, and the results of her firm but kindly treatment of them are most encouraging. In a very short time a marked change for the better is to be observed, both in their morals and in their health; and those who but a few weeks before were looked upon as the dregs of society are to be found living in a decent and respectable manner. Several ladies have undertaken this same class of work in New York; the one who has been engaged in it for the longest time having at present a hundred and seventy-three families under her charge in three different parts of the city.

The Association for Improving the Condition of the Poor has also undertaken to improve the sanitary condition of the tenement-houses by employing an inspector to look into any complaints that are made to the association, and then seeking to remedy the evils, either by communicating with the landlord, or else making a complaint to the Board of Health. A great many inspections have been made, and much good work accomplished.

We will now return to the labors of the committee of nine.

After organizing the building association, and securing the passage of a law designed to strengthen the hands and increase the efficiency of the Board of Health, the committee felt that their mission had been fulfilled, and that nothing remained for them to do but to adjourn *sine die*. This they did on the twenty-ninth day of May, 1879, having been in existence just three months. Their final report concluded with the following words: —

"We now leave the final issue with the public. But, before disbanding, they think it of primary importance that the interest now awakened in this subject should not be allowed to die out. They would recommend the immediate

formation of a permanent organization of citizens to continue the work which they have begun, and to secure for that half of the population which is compelled to inhabit tenement-houses the fullest enjoyment of the rights to which they are entitled. The committee believe, that by combining upon it representatives of the different religious and charitable bodies, with those who have become identified with this movement, a sufficient guaranty will be given to the public for the effectual removal of abuses in the tenement-house system of New York."

In pursuance to the above recommendation, eight members of the committee of nine associated with themselves eight other gentlemen, and became the first board of directors of the "New York Sanitary Reform Society," incorporated under the laws of the State of New York on the third day of December, 1879. The following circular, issued in February, 1880, will explain the aims of the society: —

EXTRACT FROM THE CERTIFICATE OF INCORPORATION OF THE NEW YORK SANITARY REFORM SOCIETY.

The particular business and objects of the said society are to aid in all proper and suitable ways in improving the sanitary condition of the city of New York, and especially of the tenement-houses and other dwellings of the poor therein, and to promote the removal of sources and causes of disease in the said city.

The society proposes to carry out its objects by the following methods: —

1. By calling on the Board of Health to abate all nuisances that may be brought to the notice of the society.

2. By aiding the Board of Health in its efforts to secure as high a standard as possible in the construction of new tenement-houses.

3. By advocating a radical treatment of the "slums" and "fever-nests" of the city through the adoption of some plan which will insure their demolition, and the erection of an improved class of dwellings.

4. By the publication and distribution of sanitary tracts, cards, etc., containing information in regard to ventilation, cleanliness, diet, the care of the sick, and other similar matters.

5. By taking active steps to secure, when necessary, such legislation as may be required for the sanitary welfare of the city, and to counteract at all points the adverse influences of any organizations or persons who may try to evade or modify existing laws for their own advantage.

6. By doing all in their power to establish an efficient system of street-cleaning, thus removing one of the most prolific sources of disease and death to which the tenement-house population is exposed.

It will be observed that whilst the efforts of the committee of nine were restricted to "tenement-house reform," the society felt that it might with propriety occupy a much larger field of activity, and has undertaken to concern itself in all matters that affect the health of the inhabitants of the city of New York, both rich and poor alike, although fully recognizing the fact that

its purely philanthropic labors for the welfare of the poor must still be its chief duty and pleasure.

Our attitude towards the members of the Board of Health, that we have endeavored to secure and maintain, has been, that, while using every effort to furnish them with all the legislative and financial support that they require, and to stimulate an active public opinion to sustain them, to act at the same time as intelligent, fearless, and impartial critics of their work.

Our efforts during the first year of our existence have been chiefly in connection with the new tenement-houses. We have felt that nothing could be more important than the proper administration of the laws affecting their construction. In addition to the regulations in regard to light and air above referred to, we are happy to say that the Board of Health have recently struck at the root of one of the greatest evils that our modern cities suffer from, by requiring, under the provisions of the tenement-house law, that hereafter the plumbing and drainage of all projected tenement-houses must be approved of by them. We propose making an earnest effort this winter to secure the passage of a law, by virtue of which plans for the plumbing and drainage of all projected buildings, both public and private, must be submitted to the Board of Health for their approval, the same to remain on file at the health department for future reference. In order to secure the best results from this measure, it will be necessary to establish a thorough system of inspection, and to provide for the licensing of plumbers.

To those who contemplate the formation of volunteer sanitary associations, a few details of our system of organization may not prove unacceptable: Members must be elected by the executive committee, and pay an annual due of not less than five dollars. These members elect, at the annual meeting, a board of sixteen directors, in whom the by-laws vest an absolute control over all the affairs of the society. Most of this power is delegated by them to the executive committee, composed *ex officio* of the five officers of the society; namely, the president, vice-president, secretary, treasurer, and counsel. This committee attend to all the details of the business of the society, meet as often as they may see fit, and only call together the board of directors when it becomes necessary to decide upon some important matter of policy, such as the introduction of a bill into the Legislature, or the like.

Our experience has satisfied us that the utility of such a society to the community in which it exists is very great. It serves as a connecting link between the health authorities on the one side and the citizens on the other. If the usefulness of the Board of Health is threatened by adverse legislation, or by the officious meddling of selfish politicians, they have an organized body of influential citizens to turn to for support. And, on the other hand, such an association can educate and arouse public opinion far more effectively than can be expected of an official body.

XXVII.

THE DISPOSAL OF OUR DEAD.

By T. A. ATCHISON, M.D.,
Of Nashville, Tenn.

The disposal of the dead has enlisted the attention of mankind from the earliest times. Savage and civilized, pagan and Christian people, agreeing in little else, unite in a common sentiment of reverence for the dead, — a sentiment which has found its expression in the varying phases of civil and religious opinions. Cremation and mummification were the most extensively observed of all the pagan rites; but —

> "Lay her i' the earth;
> And from her fair and unpolluted flesh
> May violets spring!" —

poetically expresses the sentiment and practice of the Christian ages.

Shall Science, speaking through State medicine, invade the sanctity of Christian burial, around which cluster the holiest emotions of the soul? We think not; and yet abuses have grown out of a too tender regard for the memory of the dead, which should be corrected in the interest of the living. The location of cemeteries in proximity to populous centres, the contamination of the water-supply, and the use of vaults constructed above ground, are some of the evils loudly demanding reform.

But a grave question arises: How shall the bodies of those dying of infectious diseases be disposed of? The question presupposes danger to the living from the usual methods, — a danger which no well-informed man will deny.

If a plan can be devised which will do no violence to the poetry of death, and yet protect the public health, "it is a consummation devoutly to be wished."

It is with the hope of meeting this just and imperious demand of State medicine, that we venture the following suggestion: —

Assuming that the germ theory of contagious diseases has been very generally accepted by the profession, and assuming that the parasitic germs do not perish with the host who gave them asylum, but, retaining their vitality, either escape into the air from the dead body, which no longer supplies those vital conditions, or, awaiting in the grave its final destruction, find their way by percolation into potable water, and thus renew their work of destruction. Observed facts seem to warrant both assumptions, which, if true, lead to the following conclusions: —

First, that the body, pregnant with death, must be immediately consumed by fire, — cremated; or, second, the disease-germs must be destroyed in the body.

To the first there are serious objections. Most people would rather give up their lives than their prejudices, and it is probable that the people could never be brought to the adoption of a practice so abhorrent to their sensibilities; and, again, its efficiency is seriously doubted, unless carefully conducted under scientific supervision.

Against the latter procedure no objection can be taken: on the contrary, it makes possible Christian burial, with its sweet ministrations of sorrow, in the midst of an epidemic. But can the disease-germ be destroyed without involving the destruction of the body? In that lies the gist of the whole matter. Relying on reason and analogy, in the absence of direct proof, we think the question may be answered in the affirmative.

If the hypothetical germs are living organisms, they are subject to the laws which govern all living matter. Cell-life may be as certainly destroyed as more complex organisms. The albumen in the one is as readily coagulable as in the other by chemical re-agents: the only difficulty in the way is in bringing the re-agent in contact with the infinitely minute organism; but is this difficulty insuperable? We think not. When it is remembered that the body is built up on the blood-vessels, and that every molecule of matter is reached by those vessels, it seems no difficult matter to bring a chemical re-agent in contact with a living organism, however inconceivably small or securely hid, by the simple and familiar process of injecting the blood-vessels, after the manner of embalming. A means which hinders the putrefaction process might *a priori* be credited with antiseptic powers. The most efficient agent to be employed must be determined by scientific experiment; but, in the present state of our knowledge, it would seem that the soluble salts of mercury are the most deadly protoplasmic poisons. Of course, for additional security, the body should be washed with the antiseptic fluid.

The advantages of this method of treating the bodies of persons dying of infectious diseases are, —

1. No violence is done to prevailing customs and opinions.
2. The operation may be quickly performed by a trained nurse or medical tyro.
3. It is inexpensive.
4. It promises more security than methods hitherto suggested, except the costly and impracticable process of cremation.

XXVIII.

STORM-WATER AND HOUSE-DRAINAGE IN SEWERS.

By ROBERT MOORE, C.E.,
Sewer Commissioner, St. Louis, Mo.

Whenever the site of a town or city comes to be much crowded, the need of sewers for the carriage of surface and storm water is sure to be felt. In such cases open channels for water, whether natural or artificial, are an obstruction to business, and are certain to become polluted and offensive.

In London, for example, the old River Fleet, which was counted as a navigable stream, became at last such "a grievous and dangerous nuisance," that in the time of George II. (about 1735–40) it was arched over, and became thereafter the Fleet Sewer. Part of the ground formerly occupied by the stream was then utilized as a site for a market.[1]

In almost every city the early sewers have had the same origin as this one. The open channels have become a nuisance, and the ground which they occupied has been needed for purposes of business. In fact, until forty years ago, the carriage of surface and storm water was regarded as the only function of sewers; and the use of them for any other purpose was discouraged, and even positively forbidden by law. In St. Louis the ordinances passed up to 1842, authorizing private parties to lay sewers in the streets for the drainage of their own property, used to contain the proviso "that no privy be permitted to drain in the same." In London the restrictions in regard to connecting house-drains with the sewers, which amounted almost to prohibition, were not removed until about 1844.

But, with the general introduction of water-service, including water-closets into houses, which took place about this time, the amount of liquid waste was increased to such an extent that the use of the sewers to carry it off became a necessity, and was finally sanctioned by the law. The removal of excreta and house-refuse by means of water, thus gradually established, has been found to be attended by such marked sanitary benefits, that this is now regarded as the chief use of sewers; and their original purpose, as substitutes for the natural water-courses, is in danger of being forgotten. It is now maintained by some that the former practice should be inverted, — that sewers should, as a rule, be built for house-drainage only, the storm-water being excluded from them and allowed to run off on the surface, or, if necessary in rare cases, into a separate set of sewers built specially to receive it.

In support of this system of drainage, it is argued that its adoption is

[1] See Report from Select Committee on Sewage (Metropolis), 1864, pp. 125, 126.

attended with a great saving in expense. Sewers to carry house-drainage only, need not have a hundredth part of the capacity of those designed to carry off the water of storms; and it is therefore urged, that, by excluding the rain-water, the cost of sewerage will be correspondingly reduced.

But, in regard to this, it may be remarked that the cost of sewers increases in a ratio much less than that of their capacity. A six-inch-pipe sewer costs now in St. Louis about fifty cents per lineal foot; whilst one of six feet diameter, with a hundred and forty-four times the capacity, costs but a little more than thirteen times as much, or less than seven dollars per foot.

Whatever the saving may be, however, it can be made only by dispensing entirely with sewers for storm-water; and this, as we have seen already, is not practicable in a large city or closely built town, except at the cost of great sanitary detriment, and inconvenience to business. If, besides the sewers for house-drainage, we build also sewers for storm-water, we have a system of vastly greater complexity and much greater cost.

As a second argument for a separate system of small sewers, it is claimed that they can be kept cleaner and more thoroughly ventilated than large sewers, and are, therefore, in a sanitary point of view, much the safer.

This claim, however, should not be accepted without many grains of allowance. For, as a matter of fact, large sewers, if properly proportioned and with reasonable grades, can be kept as clean as any others. With the grades attainable in most places they clean themselves, and there is no notion more groundless than that such sewers always contain deposit. The large sewers of St. Louis are, as a rule, as free from sediment as any system of pipe-sewers; and there is no trouble in keeping them clean, except at a few points where the grades are exceptionally flat.

But, even if the sewers be not clean, the danger arising from them may be very easily exaggerated. The sediment in sewers is mainly inorganic and non-putrescible matters, such as mud from the streets, and sand or gravel from roofs. The organic matters, being lighter than water, generally pass off even in sewers with a good deal of deposit; and the very common belief that the air of sewers is particularly noxious, is a mistake. In the great majority of cases, sewer-air is not even dangerous, except it be taken in very concentrated doses, or breathed over and over in a living-room. The men who inspect and clean sewers, whose business it is to spend many hours daily inside of them, have quite as good health as other ordinary laborers.

Whatever be the danger from this source, however, it is one which it is very easy to ward off. By means of open-grated man-holes, placed every three or four hundred feet along the sewer, the air which it contains may be so frequently changed and so much diluted as to be rendered wholly innocuous. If, besides this, the house-drains be provided with disconnecting traps, and with soil-pipes open to the air at both ends, the danger from "sewer-gas," as it is termed, is reduced practically to zero. And, without these precautions, small sewers are quite as dangerous as large ones. Indeed, Dr. Buchanan, medical inspector for the English Local Government Board, after a very care-

ful study of an epidemic of enteric fever in Croydon, which is drained with small-pipe sewers, states, as well-established conclusions, that noxious germs in small sewers produce a more intense poison than in large ones, and that the small sewers need the more frequent openings for ventilation.[1]

Still another argument for separating house-drainage from storm-water is, that it very greatly simplifies all problems of sewage disposal.

In this, it must be confessed, there is great weight. Wherever sewage has to be got rid of by pumping, or used for purposes of irrigation, it is very important that its volume should be kept as small as possible; and this is best accomplished by the complete separation of house and manufacturing sewage from every thing else.

For the great majority of towns on the Mississippi River or its principal tributaries, this consideration has, however, no force. Cincinnati, Louisville, Kansas City, and St. Louis have only to pour their sewage into the great rivers in front of them to have it taken away forever, and, to all intents and purposes, destroyed. But there are many other cities and towns situated on small streams which cannot receive sewage without pollution, or on bodies of water without current, or on grounds too low for drainage without pumping, where no such easy method of disposal can be adopted, and where the question of how to get rid of their sewage is one of great and ever-growing difficulty. For all of these, whatever method of final disposal be adopted, the complete separation of house-sewage from every thing else is one of the first and most important steps.

But, with provision once made for the house-drainage, there are many small towns and cities where for the time being, and perhaps for many years, the storm-water can safely be allowed to pass off through the natural channels, though in the end, as we have seen, it will usually be found necessary to replace these channels with large sewers.

In conclusion, the whole matter may be summed up into the following propositions: —

1. Sewers for storm-water are needed in closely built towns to take the place of the natural water-courses, which are obstructions to traffic and injurious to the public health.

2. Where the outfall of these sewers is into a tidal current, or into a stream large enough to be beyond danger of pollution, it is cheapest and best to use the storm-sewers for the reception of house-drainage.

3. But, where no such outfall can be obtained, the best method is complete separation, so that the storm-water system shall receive no house-drainage, and the house-drainage system shall receive no storm-water.

[1] See Report of Medical Officer of the Privy Council for the year 1875, pp. 47, 48.

XXIX.

STORM-WATER IN TOWN SEWERAGE.

By GEORGE E. WARING, Jr.,
Newport, R.I.

One of the most important questions now before the sanitarian, and very much the most important before the sanitary engineer, is the question of the best methods for disposing of the surface-water of cities and towns; that is, of the rain falling on the natural or unimproved surfaces, on the paved area, and on the roofs of houses.

The direct bearing of this question relating to the degree to which the soil is to be made wet, and the degree to which organic impurities on the surface are to be washed away or to be concentrated in depressions, affects directly the healthfulness of the community. Aside from all sanitary considerations, there is a very important one relating to convenience, and to the protection of public and private property from injury by floods. That this water must be got rid of, and that it must be got rid of in such a manner as to do the least possible harm to the health of the community, and with the least practicable cost, is a fundamental fact to be borne always in mind. Economy and convenience are sure to assert their importance in any consideration of the subject. The sanitary effect of the method of removal adopted is not so sure to command attention, but it is very sure, sooner or later, to assert its influence.

I have been led by circumstances to give especial attention to this subject for a number of years past. I began, as any student of engineering would naturally begin, by accepting as inevitable, or at least as most judicious, the methods of disposal universally adopted. I have ended, as I believe most intelligent and fair-minded men must end, after a careful consideration of all of the arguments bearing upon the case, with the conviction that the prevailing practice has been radically wrong, and that simplicity, economy, and, above all, the best observance of sanitary requirements demand in almost all cases, if not indeed everywhere, an absolute separation of household and manufacturing waste from the surface flow.

The almost universal custom concerning the treatment of storm-water in sewered towns has been a very natural outgrowth of circumstances. The first sewers were simply natural water-courses, covered over or continuously bridged to obviate their interruption to traffic, and to protect their channels from the reception of garbage and filth. As the paving and roofing of the area increased, the flow of storm-water became more and more rapid, with the natural result, that this discharge was delivered into the covered channels to get it

out of the way. To secure a further extension of this convenience, underground branches of these water-courses were laid to other parts of the occupied area until a more or less complete network of covered drains resulted.

The annoyance from the accumulation of foreign substances admitted to these rough channels led to the paving of their bottoms and the walling of their sides, and gradually, through various improvements of form, to the large brick sewer of modern times, and, for minor extensions of the system, to the use of pipes of large diameter.

It is only at a comparatively recent day that the almost universal restriction concerning the admission of filth to such sewers was withdrawn, and that they came to be used for conveying the wastes of human life. The withdrawal of this restriction was about coincident with the introduction of water-supply and of the system of water-carriage for the drainage of houses. No other vehicle for removing household wastes is so convenient or so cheap as aqueduct-water, and the facilities for its discharge which large sewers afford are sufficiently good to secure the transmission of our off-scourings more or less completely to a distant point.

We have through long practice grown up with the belief that deep sewers are necessary for the removal of storm-water; and this necessity being conceded, we have not unnaturally sought to avoid the mistake of cutting a big hole for the cat and a little one for the kitten by turning both sewage and storm-water into the one large channel. This seems the simplest way to accomplish the end, and it has the sanction of a sufficient antiquity to have commanded general adoption.

In discussing this subject we should try to divest ourselves of the influence of preconceived opinions and of universal habit, and look at it in all its various bearings. The large sewer is the outgrowth of a desire to get rid of surface-water, and, incidentally, of so much of the soil-water as is likely to make our cellars wet. It had in its inception nothing whatever to do with the removal of filth from houses. This further duty has been thrust upon it simply because it was capable of performing it without the expense and complication that would attend the introduction of a separate set of works.

In 1842 Mr. Edwin Chadwick, the father of sanitation in England, — a most intelligent man, but not a professional engineer, — made the suggestion, and supported it with strong arguments, that household wastes and matters of like character should be provided for by a separate and distinct system of pipes. He has long been supported in his opinion by Mr. Robert Rawlinson, C.B., now the engineer of the Local Government Board, and, beyond question, foremost in his profession in England. Practically, no considerable amount of public work has been carried out in accordance with the suggestions of these gentlemen. Communities are slow to try experiments in engineering, and the force of precedent has such effect nowhere else as with the class of minds usually charged with the regulation of municipal affairs. Indeed, it is not clear that the few attempts made in England to carry out the separate system have been altogether satisfactory. The storm-water sewer of the im-

proved modern form has at least the advantage that, from time to time, it receives very copious flushing from the rainfall; so that, usually before obstructions accumulate to such a degree as to choke the channel completely, there comes a storm of sufficient volume to wash out the deposits, and give the sewers a fresh start. Sewers constructed for the removal of foul sewage only, and without special means for flushing, are quite sure, however small, to become more or less filled with accumulations, especially near their dead ends. Consequently, in the state of the art a very few years ago, there was good reason for hesitating to accept the suggestion for a separate system, and for adhering to a plan which, whatever its faults, had the advantage of always working with tolerable certainty, and moving along our off-scourings toward an ultimate outlet.

That the state of the art has entirely changed within the past decade, and that the arguments formerly obtaining against the separate system are no longer valid, I shall propose to show in good time. Let us first consider what are the objections to the present mode of disposing of surface-water by its admission into deep underground sewers traversing every street of the town.

One office of a copious rainfall, one effect which it is sure to produce, is the removal of accumulations of earth and organic matter from the surface of the street. These two very different substances are carried forward together, and are delivered, often at every street corner, into a catch-basin, which quiets the flow and permits the solid substances that it carries to be deposited. The completeness of the deposit is proportionate to the volume of the flow, and to the specific gravity of these solid matters. So much of the dirt as is carried off from the surface of the street by a light rain is quite completely deposited in the slightly disturbed water of the catch-basin. If the storm is more severe, the erosive action of the surface-water is greater; more solid matters are carried into the catch-basin; and the commotion of the impounded water removes a much larger proportion of the lighter and finer substances. Little by little, as time goes on, these deposits accumulate in various strata of fine dirt, involved organic matter, coarse gravel, and much incidental rubbish. Once firmly settled in the catch-basin, the material remains until removed by hand. While so remaining, its organic portions undergo decomposition, with an insufficient ventilation, and produce resultant gases of an offensive and often dangerous character. These gases, especially during protracted seasons of drought, manifest themselves to the senses of all who pass or who live near to their source. The catch-basin almost invariably has some form of trapping device depending upon the interposition of a water-seal. In dry weather the water is evaporated, the seal is broken, and an escape is afforded for the air of the sewer.

During a rain the water flowing from the catch-basin into the sewer carries greater or less quantities of foreign substances. In a light rain it may be mainly the coarser and lighter parts of the horse-droppings which so pass. During heavy rains a greater disturbance of the water causes the removal of more of the deposit, some of this being already in an active state of decom-

position. All of these substances pass into the sewer, from which they are completely or partially removed, according to the exactness with which its scouring quality has been developed in its original construction.

For the sake of uniformity more than for any sounder reason, this system of storm-water removal is not confined to those parts of the town where storm-water may ordinarily become a source of annoyance or of danger to property, but is made to apply universally to every part of the town, the catch-basins being placed so near together that in an ordinary rain the flow through the gutters is not sufficient to remove any thing like all of the filth; much of it is swept together into local deposits, which, under our American system of street-cleaning, remain for an indefinite time, and which are offensive, if not injurious, so long as they do remain.

It is usual in constructing a plan for the sewerage of a town to arrange for the removal of a certain proportion of the water of storms of a certain amount, what is in excess of this amount being got rid of by storm-water overflows. If the amount of rainfall which it is arranged to remove is very small, the purpose is only incompletely attained. If the provision is for the removal of a large rainfall, then the sewers are necessarily too large to be cleansed by lighter rains, and the larger sewers of the system, unless of steep inclination, are very sure to accumulate deposits to a considerable amount. These deposits are less favorably circumstanced as to ventilation than those in the catch-basins; and, while it is by no means universal, it is very general for the larger sewers to be, except immediately after heavy rains, foul with accumulations of organic matter undergoing a decomposition which produces the "sewer-gas" with which we are so familiar. There is doubtless a very considerable production of sewer-gas due to the deposits of street-wash alone; but, when we add to these deposits the adhering filth derived from our house-drains, its character is very much aggravated, and the resultant gases become much more pernicious. The confined air of our large, unventilated city sewers is rich in the products of this combined decomposition.

It is a favorite theory with engineers that complete ventilation will render these gases inoffensive and harmless. Theoretically this may be true: practically it is not true, for the reason that the complete ventilation of a large storm-water sewer is substantially impossible. The truth of this statement is very clearly established by the condition, especially during warm weather, of the Fourth-avenue tunnel in New York. This is a large underground roadway less than half a mile in length, and containing two railroad-tracks. It is entirely open at each end, and its course is in the direction of the prevailing winds. Its roof is pierced with a constant succession of large openings, probably from eight to twenty feet in diameter, opening directly to the sky. The constant passage of cars in both directions must act as a very important source of movement in the air. The utmost care is taken to keep the road-bed clean, and the walls and roof are whitewashed with great frequency. Disinfectants are freely used, and every effort is made to secure a pure condition of the atmosphere. The result is, as nearly as possible, a total failure; and at

times the whole atmosphere of the tunnel is absolutely sickening. If no better result can be secured under these most favorable circumstances, what are we to expect of a sewer four or five feet in diameter, deep in the ground, foul from end to end, and with no other means of ventilation than a dozen small holes in the covers of man-holes at intervals of three hundred or four hundred feet? The condition that we actually find under such circumstances is, almost without exception, unqualifiedly bad. The suggestion has been made that these sewers may be kept safe and sweet by dispensing with the traps on house-drains, and furnishing ventilation through the soil-pipe which extends from every connection. So far as the sewer is concerned, this would doubtless mitigate the difficulty to a certain degree; but it is certainly of very questionable propriety to establish such a source of foulness as the decomposition of the filthy deposits of a sewer, and then to attempt to alleviate the difficulty by carrying the extremely offensive gases through our soil-pipes.

The ingenuity of the engineering profession has exhausted itself in attempting to get rid of the effect of sewer-gas when once it has been produced. We have never yet reached any thing better than the terse recommendation of a London authority, to the effect that "we must let the stink out into the middle of the streets."

The conditions by which the world was driven to this very unsatisfactory result were, under the old systems of flushing, substantially unavoidable; and what has been done in the way of city sewerage has been in the direct line of progressive improvement. It seems to me that the time has now come when a new departure should be taken, and when the sewer-gas difficulty should be met by prevention, rather than by attempts at cure. It is clear, that, under the present combined storm-water and foul-sewage system, prevention is simply impossible. The production of foul gases is an unavoidable attendant upon every application of that system. All that is to be said on the other side is, that, to withdraw the flushing effect of storm-water, and to leave household wastes to take care of themselves in small pipes, would result simply in an aggravation of the difficulty.

Fortunately, within the past few years, the conditions of the problem have been radically changed. Formerly it was restricted by limitations in the matter of flushing. Small pipes could not safely be used for sewage proper to the exclusion of storm-water, because storm-water was needed to flush them out. This statement of the case is practically true, although not strictly true. Flushing by means of man-holes at the heads of the lines into which water was to be poured, or where a tumbling-tank might be set, or flushing by means of various manual operations, all made the use of small pipes possible, but left it very undesirable, inasmuch as it is always undesirable to rely on manual operations, or on the action of moving mechanism to keep sewers in condition. It is therefore quite proper to say that the possibilities of the art of sewerage underwent a radical change on the invention of Rogers Field's annular siphon for emptying flush-tanks. This invention, which includes no moving parts, and the action of which is positive, makes it possible for us to

accumulate the flow of a stream yielding not more than five gallons per hour until it shall have filled a tank or reservoir of any desired size, with the certainty that the continued flow of the same stream, after the tank shall have become full, will cause the whole accumulation to be discharged into the head of the sewer with such rapidity and force as to give it an effective flushing. It is now entirely safe to use pipes of as small size as the quantity of the sewage will permit, and recourse to storm-water flushing is no longer necessary.

Therefore the question of what we are to do with storm-water presents itself in a new form. It seems to me very clear what we are not to do with it; that is, that, in my opinion, we certainly ought not to admit it to sewers which are in connection with the drains of houses. While the impurities of storm-water are by no means the *chief* factor in the production of sewer-gas, the admission of these impurities to large sewers is undoubtedly the most serious *cause* of its production. Fæcal matter carried completely through the sewers, and discharged at its outlet within a few hours of its admission, would do no especial harm; but fæcal matter added to the accumulations of mud and sand and sticks and rubbish strewn along the usual large brick sewer, in the absence of daylight, and practically in the absence of ventilation, is so situated as to produce its very worst effect.

As I have already said, the question, What shall we do with storm-water? is the most pressing one in sewerage engineering at this time. Our practice has been almost universally to deliver it into deep sewers. This, I venture to say, is generally a mistake, and is almost always quite unnecessary. Proper provision being made for the drainage of the subsoil, our only care with regard to the rainfall is to provide means by which it shall escape without material inconvenience to traffic; that in its escape it shall wash the street-gutters, and that the greater storms shall not harm public and private property. There is nothing in the nature of rain-water which makes its temporary presence on the surface of the ground injurious to health. There is no reason why it may not be discharged over the surface of the streets and along the gutters, provided its volume is not so great as to interrupt or seriously to interfere with traffic. Therefore, as the roadside-gutters are in full view, and may easily be kept clean and in repair, there is no reason why the water which falls from the heavens may not flow through them for at least so far as they are able to keep it within bounds. Sooner or later, in the larger cities, the water of copious rains will get beyond its bounds; and the flow of the gutters will spread out over the street, or will rise on to the sidewalk. After the discharge of a certain number of gutters has accumulated, there may be danger, during violent storms, of injury to the pavement, of the filling of cellars, or of serious interruption to travel. Then, but not until then, it will become necessary to carry the flow below the surface of the street, and lead it to a safe point of outlet.

Now there is a great difference between carrying storm-water underneath the surface of the ground, and only at points where there is danger of serious flooding, and the present practice of carrying the whole rainfall from the hill-tops as well as from the valleys, first into foul and costly catch-basins, and then

into deep and costly sewers. In my judgment, the latter course is, to use the mildest expression, unscientific and unpractical; while the other fulfils the best requirements of common sense. If the art of town drainage had never been practised, and if the proposition were made for the first time to Mr. Chesborough or to Mr. Lane or to Mr. Moore or to Mr. Shedd or to Mr. Philbrick, — all skilful engineers, — I am sure that it would never occur to one of them to get rid of it by channels from ten to twenty feet below the surface of the street, and extending under all the streets of the city. It has been led there only by the conditions under which the work of sewerage has been developed. The occasion for its being taken there no longer exists, and an entire reformation in this part of the work is demanded.

It would be absurd for any one at this early day to prescribe any substitute for the old practice as being the best. All that it is safe now to say is, that storm-water should be kept on the surface of the streets as long as possible; and that, when its accumulations must necessarily be carried beneath the surface, they should be carried only to such depth as is requisite to get them out of the way, and to prevent the filling of their channels with ice during slight flow in cold weather.

It will probably be a long time before we arrive at the perfection of this method of delivery. We shall have annoyances of various sorts, and we shall doubtless encounter some serious difficulties in the matter of the crossing of streets. Until some substitute is devised for depressed gutters we shall receive a certain amount of unfavorable comment from those who enjoy a level and uninterrupted roadway. Let us remember, however, that all of these drawbacks relate solely to the personal convenience of the people, and that they involve no serious dangers. That we may not be appalled by the idea of creating such annoyance, let us consider for a moment the other side of the question. Leaving now entirely aside all consideration of sewer-gas, the cleansing of large sewers, etc., think for one moment of the effect of the rapid delivery through sewers of storm-water, which, if flowing more slowly through the street-gutters, would do no material harm; think of the gorging of the large sewers of Providence, and the back flow of sewage-matter through the kitchen-sinks and basement water-closets of some parts of that city; think of the vast trouble of a similar kind that has occurred in Brooklyn, where not only have the houses themselves been invaded by sewage-matter during heavy storms, but where the man-hole covers have been lifted, and the torrent has poured over the surface of the streets and of the sidewalks; think of London, the theatre of the proudest achievements of the drainage engineer, a city whose intercepting sewers are a model for the world, and all of whose ills were supposed to have been cured by Sir Joseph Bazalgette's achievements, but where, alas for the hopes of the engineer! he has been, if not hoist by his own petard, drowned in his own sewage.

Many of the lower parishes are crying aloud for relief from the stinking floods with which the new sewerage system is deluging their poor inhabitants. The storm-water has been got rid of with a vengeance. It has been robbed

from the surface of the streets, where it would have done good sanitary service in flushing the gutters, and has been delivered into sewers of great velocity, to accumulate at the lower levels far beyond the capacity of the pumps to remove it, and has become the curse of wide, low-lying areas, where, but for the sewers, it would at least have arrived so gradually as to have done infinitely less harm.

In closing, permit me to formulate my opinion on the subject, by saying that the present manner of disposing of storm-water in sewered towns by removing it from the surface, where it is needed, to the sewer, where it creates a nuisance, is a "relic of barbarism," and — I beg that my respected friends of the engineering profession will pardon me — that its continuance indicates an overriding of reason by tradition.

XXX.

SOME SUGGESTIONS IN REGARD TO SANITATION, AND THE DRAINAGE OF SMALL CITIES AND TOWNS.

By D. H. DUNGAN, M.D.,
Little Rock, Ark.

The question of quarantine has been abundantly discussed, both by the profession and every member of society who considers himself at all interested in the health of the country.

But, while this has been the case ever since the outbreak of our yellow-fever epidemic of 1878, we have failed to see a corresponding interest manifested in those measures which tend to improve the health of communities.

These we believe to be questions of the first importance; and in their consideration, and the execution of such judicious plans as may be suggested, lies the health, first, of the communities, and, second, of the country at large.

We therefore deem it not inappropriate that any member of this body should place before it any suggestion that, in its execution, may improve the hygienic condition of villages, towns, or cities.

From a sanitary point of view, two questions of importance present themselves to the citizens of every densely populated district; namely, the supply of an abundance of pure water, and the disposal of disease-producing filth and offal.

The first may be efficiently answered by one or another of the various plans for supplying water by wells, cisterns, hydrants, etc.; but it is not the intention of the writer to discuss this question in the present paper.

The second — the disposal of offal — is one far more difficult of solution; but this difficulty does not arise from the inability of scientific men to devise plans for its accomplishment.

The failure of any plan of sanitation depends, *first*, upon the failure of the law-making power to recognize its importance; *second*, upon the failure of the people to comprehend the measures proposed as conducive to good health (or the inherent perversity of many who prefer filth to cleanliness); *third*, inefficiency in the execution of sanitary laws.

If we are charged in any instance with the failure of a sanitary plan, — our reply being that the plan has not been carried out, — we are always met by the counter-charge that it was impracticable.

It behooves us, therefore, in presenting any plan for the sanitation of the household or the community, to consider well that it be practicable, both in point of economy and the ability of the executive to accomplish its fulfil-

ment, to see that every one complies with its requirements. Our effort will therefore be to present a plan which, with such modifications as may be hereafter proposed, will be practicable as viewed from any of these points. We will be as brief as possible.

Being a member of the Board of Health of the small city of Little Rock for several years, and the city being entirely too poor to construct an efficient system of sewerage, my attention was often called, both by my own senses and the appeals of citizens, to the very filthy condition arising from accumulated excrement in pits and cesspools.

The adoption of the "dry-earth system," somewhat modified, and much cheaper than the "earth-closet" plan much in use, was suggested; and, being seconded by the Board of Health, was quickly tested by many of our best citizens, including a number of intelligent physicians.

So far as my personal observation and inquiry has extended, this plan has given entire satisfaction wherever faithfully tested.

The plan is simple, — you may say "primitive" in its simplicity. It is this: Let the excrement fall on the surface of the earth; allow free access of air (from every quarter if practicable) and sunshine (I will say in this parenthesis that air and sunshine are the best disinfectants we have any knowledge of); keep a supply of pulverized dry clay in the closet, and throw down enough every day to cover well all that has fallen. When enough has accumulated, have it removed by a cart, or shovel it on to the compost pile, and let it go as other manure. There is no stench; there is scarcely any odor. An average of half a barrel of clay for each person is sufficient for one year.

It was shown by Col. Waring in his practical paper on sewerage, presented at our meeting in Nashville last year, that, for towns and small cities at least, the rain-water can easily be disposed of by surface-gutters; and his statement that "sewers large enough to carry off the storm-water become, during dry and hot seasons, sewers of deposit to such an extent as to have their air made most foul by the decomposition of their sediment," will find confirmation everywhere when investigation is made.

These facts, connected with the numerous instances brought before us every year through our periodicals, of outbreaks of epidemics of diphtheria, typhoid fever, and yellow fever (instance, Grenada, Miss., in 1878), traceable to bad management of closed sewers, have presented to my mind so forcibly the necessity of abandoning, if at all practicable, all closed sewers, that I have formulated the following plan for your consideration.

It is intended, for the present, to apply only to towns and small cities, as it will require some experience to determine to what extent it can be made available.

First, Abolish all closed sewers.

Second, Adopt the "dry-earth system," as herein proposed.

Third, Let each municipality establish a scavenger department by which all solid offal and garbage shall be promptly removed.

Fourth, Construct a system of surface-gutters of gradually increasing dimen-

sions, of sufficient capacity to carry all rain-water, so arranged that, when necessary, the larger gutters may be covered with iron grating.

Fifth, Let the beginning of each gutter be provided with a hydrant of sufficient capacity to flush it to its junction with another gutter. (By this arrangement, when all the smaller gutters are flushed at once, the larger ones would be filled and cleansed.)

Sixth, Allow all waste-pipes and private drains to connect with the gutters.

Seventh, Secure such legislation as will enable municipal authorities to compel obedience to sanitary laws; and,

Eighth, *Let the executive authorities see that these laws are obeyed.*

A few of the advantages of the open drain are, that it is always open to inspection, and dangerous substances can be removed before mischief is done; and, as with this plan nothing filthier than dish-water and soap-suds would enter the drains, but very little disease-producing *débris* could, under any circumstances, be retained.

Their cost would be nominal, as compared with the cost of covered sewers; for their construction would, in the greater part, be accomplished in the necessary grading of the streets and sidewalks.

A few of the disadvantages of the covered sewers are, that the cost of their construction renders them altogether impracticable for many towns and small cities.

Being always closed, and never subject to inspection, dangers are only known to exist by their effects, *after the mischief has been accomplished.*

Finally, it would be much easier to police the back premises of houses, to see that every one complies with the law, than to keep an efficient inspection on covered sewers, to see that they, with their required traps, are kept in order, or that their obstruction does not convert them into cesspools for the manufacture of foul and disease-producing gases, or hot-beds for the production of ultra-microscopic organisms, that, being freed from their restraint, shall go forth to disseminate diseases and death, while the place of their origin remains a mystery to their victims, or those who loved them.

XXXI.

ON THE ACTION OF MUDDY WATER ON SEWAGE.

By Professor WILLIAM H. BREWER,
President of the Board of Health, New Haven, Conn.

This paper is offered merely to suggest an inquiry which may, or may not, lead to useful results in sanitary science. It has long been known that various saline, acid, and other substances dissolved in water hasten the deposition of solid matter suspended in that water; and it has been claimed that a little sewage in river-water tends to make it clearer and more transparent, and thus improves it for certain manufacturers' uses.

I published several years ago, in another connection, the mutual action of muddy or *roiled* waters and liquid manures on each other, and then gave some account of experiments upon which the conclusions there given were based. I found that the juices from barnyards, diluted sewage, etc., had a marked effect on removing the turbidness of such waters.

Those experiments have been continued. They relate primarily to the deposition of clay (and other suspended solid matters) from water, the causes which hasten or retard it, and various phenomena pertaining to it. I may say that the purer the water, the longer it takes the last portion of the suspended matter to settle to the bottom; and it seems to me probable that in very pure water (that is, water containing little or nothing in *solution*) the finer particles of clay may remain suspended, it may be for centuries, if, indeed, it ever would become entirely clear. It will certainly retain an opalescence plainly visible for some years. Specimens kept under conditions of quiet and darkness favorable to deposition seem still as opalescent as they did two or three years ago; and yet, with the addition of a minute portion of filtered sewage, they become absolutely clear, so far as the naked eye can distinguish, in a few days.

Whether this be due entirely to the mineral salts of the sewage, or not, I have not proved; but I have proved that some organic substances (and which are not crystaloids) do hasten the clearing of the liquid.

I need not here discuss the comparative effects of crystaloid and colloid substances in hastening or retarding the deposition of suspended matter. I will merely say that the experiments I have made make me suspect that muddy water and sewage *have a tendency* to mutually purify each other, and that sewage discharged into a river of muddy water would be more rapidly purified of its putrescible material (the *albuminoids*) than if it were discharged into a river of clear water; that as the suspended mud is *curdled*, as it were,

by the action of the sewage, and settles quicker, it carries with it more or less of the putrescible organic matter, whether in suspension or in solution.

This partial purification would not necessarily extend to the removal of the specific germs of certain diseases which we know may exist in waters of great transparency. It applies merely to the dissolved and finely suspended matter which gives rise to foul smells, and which, in chemical analysis, is taken as the measure of unwholesome impurity. Whether the actual oxidation of the organic matter is hastened, I doubt. I think that the quicker clearing is by deposition to the bottom, rather than by the actual destruction of the organic matter by oxidation.

The unpleasant odors which sometimes occur in city waters distributed from reservoirs (odors which largely arise from the decay of aquatic vegetation when the water reaches a certain temperature) I have known on several occasions to suddenly diminish, or entirely disappear, with the *roiling* of the water by a heavy rain; and other persons have told me of similar observations.

There are several very interesting scientific problems involved in this subject, the investigation and solution of which may lead to important practical results to sanitary science; and I offer this suggestion at this time, hoping that persons living on these Western rivers, and who have ample means of observation, may make a more detailed and practical study of the matter than I have been able to.

P. S. — Laboratory experiments suggest that probably a sort of combination takes place between the organic matter in foul waters and the suspended clay, somewhat analogous to the *lake* which is formed in the use of certain aluminous salts with organic dyes. Since the reading of the above paper an examination of some of the phases of deposition going on at the mouth of the Mississippi suggests that some of the curious *mud-lump* phenomena may possibly be found, on further investigation, to be related to this re-action of the organic matter on the mud brought down in the river-water. The evolution of inflammable gas, the foul smells attending their disturbance, and other related facts are very suggestive, to say the least.

XXXII.

THE SANITARY URGENCY OF THE FLORIDA SHIP-CANAL.

By JOHN GAMGEE.

Science has been retarded by a confusion of tongues. No branch of it illustrates this better than medicine. Imperfect as we must admit natural-history classifications to be, and barbarous as are their nomenclature, the defects are more glaring in the field of progressive pathology. Precision of knowledge demands precision of language. We name things long before we understand their nature. Naming them wrongly, or without reference to their most general characteristics, we convey no just idea of their significance, nor of their relations to causal or consequent phenomena.

Read the list of synonymes for that most inadequate expression, yellow fever. Until this was invented last century, the more general appellations, "bilious fever," "malignant fever," "effects of climate," and, in Spanish or Portuguese, the far better and perhaps best of all names so far adopted, "calenture," or heat disease, were in vogue. Sailor's fever, stranger's fever, "flux," and "dysentery," with a host of others too numerous to mention, enshrouded the past ravages of this pest in a mystery which baffles the historian until penetrating beneath the surface of casual research. This Babel, within a century, has confounded yellow fever with land endemics characterized by yellowness. The bilious remittent of the Mississippi Valley, the yellow disease of this continent, which is but an aggravated chronic result of malaria, African and West Indian fever, have all crowded the pages of hasty writers, with the effect of still leaving a remnant of physicians who believe this plague to be a product of American soil.

Candid men will admit that, until quite recently, the domain of yellow-fever discussion and writings might be denominated chaos. No man did more to perpetuate an unfathomable diversity of opinion and thought than La Roche. For five and twenty years he has imposed his illogical and rambling views on American students of medicine. It is time this should cease.

Can we briefly indicate a point of contact which will further the interest and instruction to be derived from such discussions as I now propose? The prevailing and undoubtedly correct view is, that no such epidemic afflicts this soil without the introduction of some foreign element by ships. It is an exclusively naval importation. We shall not discuss whether every vessel has received poison from sea or land. There are persons — *a very few* — who believe that, as in small-pox, a pre-existing case fathers every instance of such sickness. The majority believe that the human system is no essential factor in the production and transmission of this cumulative and virulent poison.

Whatever may be the derivation of the potential element which contaminates the ship, since it reaches all known lands *from the sea*, we may term it *pelagic*. For a century and more the idea has prevailed that this is a genuine fever, — a pyrexia. It is certainly very different from all diseases with definite periods of incubation, — periods so definite that a few hours, if not minutes, count the variations in usual or normal development. These diseases run a distinct and unalterable course, with a peculiarly marked crisis, to be followed by resolution or death. There is so much to be said in favor of yellow fever being a form of simple and usually severe poisoning by material totally extraneous to human development, in contradistinction to every form of human virus producing true and specific fevers, that I propose we shall call it — what it surely is — a pest or plague, not a fever: hence my name for it, "pelagic pest," or "*pestis pelagia*," — plague of or from the sea.

In favor of this designation I shall adduce the views of only one authority. My choice is guided by the fact that Auguste Frederic Dutroulau, the renowned French naval surgeon, has been quoted repeatedly by Dr. Chaillé in opposition to my views. It being understood that I am not discussing the origin of yellow fever, I shall not quote the mid-ocean observations of Dutroulau. In the Parisian Archives of Medicine for 1853 he declares the conclusion authorized that "the miasma of yellow fever derives one of its *essential* characters from the influence of the sea."

More recently, in 1868, he testifies that the "primary cause of yellow fever is localized on the sea, — an infection proper to certain maritime localities." Even forgetting his earlier and most valuable observations on yellow fever at sea, on board the "Cuirassier," and accepting the contagious character of yellow fever, he insists on primarily recognizing as a duty the protection of land from infected vessels.

It must therefore be admitted that *pelagic pest* correctly defines that most general feature, distinguishing yellow fever from every other known disease. This is more than can be said for any other name hitherto employed.

Last winter I devoted some time to New Orleans. The impressions left on my mind, after a careful survey of the location and experiences of the city, were, that, from a geographical point of view, it would have been difficult to find a site for readier protection from any plague of the sea, whilst surrounded by the most extensive and prolific sources conceivable for the development of land endemics. The solid structures and paving of the embanked civic area protect inhabitants from immediate soil emanations. Winds, however, waft down the streets, in a line with unhealthy marshes, the poison which produces well-marked cases of intermittents; and Dr. Gustavus Devron, to whom I am indebted for these and other data, has shown how exempt are the inhabitants of streets crossing the lines on which atmospheric currents most readily reach citizens' houses.

No wind blows yellow fever up the noble Mississippi. One hundred and ten miles of rapid river would in itself afford obstacles to the ocean contamination of New Orleans. But the Gulf beyond, now traversed by fever-ships

from the Caribbean Sea, through the Yucatan Pass, or from Havana, and much more rarely entering it by the Florida Straits, is in itself a haven of purity, — a geographical area within which the absolute preservation of this noble city from pelagic contamination may be surely and permanently consummated.

The Gulf of Mexico receives the waters and *débris* of rivers which influence its currents, fauna, and temperatures. It is swept round by the equatorial current, which is moderated by an influx of colder waters, whereby a bottom temperature of 39° is obtained, in contrast to 54° in the Mediterranean. The Gulf Stream, forcing its way past the Keys, bearing with it the genial heat so essential to the life and comfort of millions in Europe, has ever proven the friend of the mariner and preserver of ships' crews by carrying them into cooler latitudes.

The accurate and extensive investigations relating to the Atlantic and the Mexican Gulf, the services unequalled, and unmarked by any token of a nation's gratitude, of that most learned, most modest, and most zealous student of the sea, Commander Maury, the arduous labors of the officers of the Coast Survey, and the results of the most successful scientific expedition ever inaugurated by a scientific society, under the leadership of such men as Nares and Wyville Thomson, afford us material for a just insight into the main features of marine phenomena and their influence on life.

Dr. Turner has rendered it quite unnecessary for me to discuss the pernicious conditions under which human beings still float from land to land. To these, and to these mainly, we owe the possibility of pelagic infections devasting not only crews, but all confined spaces on sea and land which are directly or indirectly accessible to the emanations of a foul vessel. The freight-cars of railroads have carried these as far as Louisville and beyond, and I commend to your attention Dr. J. W. Holland's report and map on this one point.

Admitting, therefore, that vessels, especially the wooden craft of the New World, are unfit abodes for man anywhere, the consequences may be surmised of any specific contamination, whether by a pure contagion like small-pox, the transmitting elements of relapsing fever, — as amongst the Irish emigrants of 1847, — or of the putrid bilge, due to tropical Atlantic waters, removed from oxygen and Nature's unceasing cycle.

What is that cycle? In the tropics, with a mean surface heat of 75° to 80°, abundant evaporation establishes ocean-currents from the Arctic and Antarctic, which, whilst lowering to below 39° the bottom temperature, induce vertical and horizontal variations essential to the economy of the universe.

The vertical influences may be briefly stated as consisting in high density of surface-water, with an abundant supply of oxygen, amounting to thirty-three or thirty-five per cent. An exuberant development, within reach of atmospheric influence, of a marine fauna comprising globigerinæ, which are not only most abundant but largest in the warmest waters, and still more limited by temperature in their distribution are the forms of *Pulvinulina*. The structureless flesh, or sarcode, of these animals constitutes the food of swarms of

other pelagic animals; and, as with the structure of higher organisms, it is constantly decaying. Swarms are at each instant perishing: their calcareous skeleta gravitate to the bottom, and form the ocean-bed, which, according to depth, presents a varied structure. In the regions of globigerinæ ooze, the beautiful microscopical characters of a "new chalk" are discernible, with some, not many, living creatures. A little deeper the degeneration has advanced further, characterizing the gray ooze of the Atlantic bed; and, deeper still, is a red clay, the product of very simple chemical changes in the organic deposit, which Mr. Buchanan seems successfully to have repeated in the laboratory.

Down in the lowest depths the colder waters from the poles bear more oxygen essential to the chemical changes than is to be found in the intermediate ocean-layers. The amount is much less than on the surface; but it is more than at an average of three hundred fathoms, at which point it attains a minimum. Thus says Sir Wyville Thomson: "In deep water a wide intermediate zone between the surface and the layers immediately above the bottom is nearly destitute of animal life, — at all events, in its higher manifestations."

With a steadily descending temperature from the surface to the sea-bottom, there is a progressive diminution in the number, size, and variety of living forms. The Atlantic has a mean depth of two thousand fathoms; so that an idea may be formed of the singular contrasts presented by a section of the living upper strata, the relatively lifeless middle, and the deeper laboratory of physical and chemical transformations raising in æons the ocean-bed.

The balance of nature is modified in its apparent phenomena by the slightest appreciable conditions. This may be illustrated by the contrasting forms of pelagic animals on either side of the Isthmus of Panama. A difference of one degree of surface temperature between the tropical Atlantic and Pacific is one of the obvious data giving us a clue to the different manifestations of disease in the two oceans near the line. It has been attended since the probable severance of a common bed of shallow waters by uprising lands in tertiary or post-tertiary times, by such a variation in the evolution of creatures from a common stock that the specific characteristics of sea-urchins and other animal forms now demonstrate a complete isolation and contrast of the fauna of the two oceans. Nature's wheel revolves more rapidly the warmer the sea. Where there is most life we have most death; but, whatever may be the degree, as the chemist Dumas has said, there is an eternal round in which death is quickened and life appears, but in which matter merely changes in place and form.

There is one distinctive feature of the ocean which must be borne in mind in relation to the subject under discussion: it is the great scarcity of plant-life. The few algæ add little to the *sargasso* in the way of plant shelter and support for quaint and parasitic animals.

Vessels sailing for the equator, from north or south, pass from cold to temperate, and from temperate to warm, latitudes. They are struck as they

advance by the increasing phosphorescence of the sea, which attains to such brilliancy that the agitated waters surrounding a moving ship rival and exceed the starry heavens in brilliancy, and enable a person to read small print on deck. Numerous pelagic animals emit this light; and it has been thought by a French physician that one creature, *Noctiluca miliaris*, specially phosphorescent, was the critical element inducing yellow fever by its death and decay in the stagnant bilge. This, with many other intricate points, may possibly be made the subject of special experiment and prolonged research. My object to day is to insist on the conditions, established by science, in relation to the distribution of heat and living organisms on surface ocean-waters, and which tend to the increasing danger of a special and intense bilge-foulness as ships approach and are detained within the belts of tropical calms.

A prolonged and unceasing study of this question in all its bearings has tended to impress on my mind the probable truth of a generalization which may one day procure for its author a just renown. In a note on the last page of a work published in 1856 on the "Basis of Medical Science," by Dr. J. C. Faget of New Orleans, there is a casual but trenchant distinction drawn between the *atrabiliary fever* of *animal origin*, yellow fever, and the paludal fever, intermittent, of *vegetable origin*. The probabilities are that the putrescent water, crammed with sarcode, near or within the tropics, is the true parent of yellow-fever infection, just as we know that vegetable decay surrounds this city with agues and bilious remittent. The sea is the home *par excellence* of perishable animal forms, whereas the soil, or humus, is the product of a plant-decomposition, which attains undue and dangerous proportions with excessive heat and moisture.

The practical conclusion to be drawn from the very brief exposition I have made is, that a ship, to be kept healthy, must be driven fast through the dense beds of pelagic life, or kept out of them as much as possible. It is fortunate that the dangerous area is confined to the Atlantic; but, unfortunately for New Orleans, the nearest approach to the mouth of the Mississippi from the sea for many vessels has been through the Caribbean Sea, and in the direct course of the equatorial current.

A look at the map will show you that vessels from the north and north-east need not descend below the thirtieth parallel of latitude to reach that of this city. The Tropic of Cancer, the dangerous West Indian seas, the hot Caribbean, need not be traversed if the base of Florida be provided with a channel, — a great highway draining nearly a thousand square miles of fertile lands, and hastening the transport of emigrants and merchandise to and from the Gulf ports. So great, so paramount, have the advantages of this great work appeared to me since first studying the probable results — in relation to yellow-fever extensions — of cutting the Panama Canal, that I could not resist adding to the weighty reasons already assigned for the construction of the Florida Ship-Canal, those which a naturalist and sanitarian may justly emphasize and enforce.

Since 1855, when a report on survey for a ship-canal across the peninsula

of Florida was published by the corps of topographical engineers, the country has attained to commercial developments which indicate that whatever conclusions were then arrived at, as to the value of this canal, time has indicated that the results in the future are likely to exceed the most sanguine anticipations of enthusiastic promoters. I must ask you, however, to cast your eyes on a table of figures, for which I am indebted to the chief of the statistical bureau of the United States treasury. Immediately after the route for the canal was surveyed, immigration fell from 51,169 persons in 1854, to 20,388 in 1855; and last year it had dropped, by a rapidly descending scale, to 3,297.

STATEMENT SHOWING THE TOTAL NUMBER OF PASSENGERS ARRIVED IN NEW ORLEANS FROM FOREIGN COUNTRIES DURING EACH YEAR FROM OCT. 1, 1819, TO DEC. 31, 1879.

YEARS.	No.	YEARS.	No.	YEARS.	No.	YEARS.	No.
1820*a*	911	1835*c*	3,552	1850*b*	16,989	1866*c*	6,326
1821*a*	591	1836*c*	4,966	1851*c*	52,011	1867*c*	6,770
1822*a*	438	1837*c*	8,683	1852*c*	32,302	1868*c*	4,028
1823*a*	1,058	1838*c*	7,434	1853*c*	43,028	1869*c*	5,496
1824*a*	1,014	1839*c*	10,306	1854*c*	51,169	1870*c*	5,329
1825*a*	429	1840*c*	11,085	1855*c*	20,388	1871*c*	7,256
1826*a*	1,100	1841*c*	10,700	1856*c*	18,758	1872*c*	7,257
1827*a*	1,341	1842*c*	12,922	1857*c*	21,299	1873*c*	7,549
1828*a*	1,958	1843*d*	6,055	1858*c*	13,539	1874*c*	3,736
1829	3,044	1844*a*	3,899	1859*c*	11,322	1875*c*	3,053
1830*a*	2,287	1845*a*	15,537	1860*c*	13,080	1876*c*	2,877
1831*a*	3,191	1846*a*	22,148	1861*c*	958	1877*c*	2,630
1832*a*	4,397	1847*a*	34,803	1862*c*	–	1878*c*	3,170
1832*b*	–	1848*a*	19,299	1863*c*	–	1879*c*	3,297
1833*c*	4,785	1849*a*	25,209	1864*c*	–		
1834*c*	4,035	1850*a*	34,080	1865*c*	3,572	Total.	628,446

a Fiscal years ended Sept. 30. *b* Quarter ended Dec. 31. *c* Years ended Dec. 31. *d* 1st, 2d, and 3d quarters of 1843.

JOSEPH NIMMO, JR.,
Chief of Bureau.

BUREAU OF STATISTICS,
Nov. 22, 1880.

If you look back you will find that, whenever emigrations rose, so yellow-fever mortality attained a maximum. In a few months the European peasant heard of the dangers attending a visit to this region. He was driven from fields of industry, where in health he might easily have thrived; but he has preferred to brave hard winters and the labor of clearing woodlands, to risking the lives of himself and family in a yellow-fever country.

The great epidemic of 1853, undoubtedly introduced by an emigrant vessel, the "Northampton," direct from Europe to New Orleans *viâ* the Caribbean Sea, created such a panic in this country and in Europe that direct voyages to the South and the Mississippi Valley were abandoned for a safer entrance *viâ* New York to the Western States.

I regret that I am compelled to limit this fruitful field of discussion, owing

to the time allotted to the reading of this paper; but the silent figures before you are eloquent beyond any words of mine. They point at once to the vast importance of establishing a straight and speedy line of transit from Europe to this port; and a saving of nearly a week's time, with exclusion from tropical waters, signifies the permanent raising of the health standard of Gulf ports, and especially of this great commercial emporium.

In the 1855 report the important and obvious connection which the construction of this canal has with Gulf commerce was stated as follows: —

"1st, Saving a large proportion of the insurance now imposed upon it by the Florida Straits.

"2d, Avoidance of a perilous navigation.

"3d, An important saving of time, — hence of interest on capital engaged in this trade."

It is needless to allude to strategical advantages foreshadowed, although the war, which so soon followed the surveyor's words, proved that it would be well for this country to have more than one pass between the Atlantic and the Gulf.

Last session a Senate document (No. 154) was printed, entitled "Report of the Results of an Examination made of the Peninsula of Florida with a View to the Construction of a Ship-Canal from Saint Mary's River to the Gulf of Mexico." In this encouraging preliminary report Col. Q. A. Gillmore says, that, unless it can be shown "that there is likely to be a very large increase of freights seeking this route at no distant day, the construction of the canal as a private enterprise should be regarded as commercially infeasible."

On the other hand, the colonel has directed attention to the westward extensions of farming, to the yearly increase in wheat-production, and to the conditions which may revive trade on the Mississippi. He says, —

"This westward movement of the grain-centre causes St. Louis to grow in importance as a receiving and distributing depot of cereals, while the cost of transporting grain from the West by rail to Eastern ports will correspondingly increase.

"The British and Canadian Governments are making great efforts to secure as large a portion as possible of the carrying-trade of the West by improving its water-routes to the seaboard. Within three years from the present time the completion of the Welland Canal enlargement will enable British steamships of about two thousand tons to receive their cargoes of grain and provisions at Chicago and other lake-ports, and carry them directly to Europe.

"In the present condition of the lakes and Erie Canal line, the average cost of carrying wheat from Chicago to New York is 8.15 cents per bushel.

"By the enlargement of the Canadian canals, to be finished within a few years, British vessels can afford to carry grain from Chicago to Montreal for six cents per bushel; and Montreal is two hundred and fifty miles nearer than New York to the European market.

"The British and Canadian Governments have nearly completed works which

will cost over thirty millions of dollars, in addition to earlier improvements on which twenty-four millions of dollars were expended, making a total of over fifty-four millions of dollars spent in order to control, as far as possible, the carrying-trade of our grain-raising States.

"With the completion of this cheap, foreign water-route, penetrating into the very heart of our agricultural region, the United States will possess no transportation-line that can compete with it on equal terms, unless the Mississippi River is improved, and all obstacles are removed that stand in the way of the most economical transportation to foreign and domestic markets of the surplus products of the Mississippi Valley.

"With the improvement of this southern route accomplished, the Mississippi River will become the great and successful competitor of the Canada water-line, for the reason that the centre of the grain-region is gradually working away from the latter. Moreover, the northern route will be closed by ice during five months in the year, while the other will be open at all seasons.

"From a national point of view, a Florida ship-canal is an object of importance as part of a comprehensive scheme for improving and cheapening our means of water-transportation from the heart of our grain and cotton growing regions to foreign ports; and there would seem to be as little need of attempting to fix its rentable or money-earning value, as in undertaking to apply the same rule to the works of river and harbor improvement prosecuted by the United States Government.

"In the case of the Canadian canals, it is not pretended that they *pay*, from a merely mercantile point of view. The chief engineer of public works of the Dominion of Canada, in his report on the navigation of the River St. Lawrence, July 9, 1874, says, —

"'It is well known that none of the (Canadian) canals have paid the interest of the money expended in their constructions, or indeed very little more than the working expenses connected with them. Still, few who compare the past with the present condition of Canada will doubt (but?) that they have been of far greater benefit to the country than the aggregate amount of their cost.'"

What more need be said to stimulate American enterprise, and to urge Congress to further any practical project whereby life and commerce in the South and West may reap all the benefits of this canal? New Orleans is naturally a healthy city. The records of operative surgeons, the experiences of such men as Andrew W. Smyth, who fear no aërial germs, and do not practise what is called antiseptic surgery, indicate that putrefaction is subordinated here in Nature's cycle, and that pestilential emanations, apart from the marsh intermittents, are foreign to this region, and indeed to this continent. Yellow fever is not a disease of the American continent. Let us, therefore, secure to New Orleans all the advantages of its latitude and its climate, of the fast-flowing river in front of it, and the wholesome Gulf beyond. Ships reaching Fernandina, whilst tracing along either of the routes marked on the accompanying map, will be under inspection, and can be purified before they cross

the Gulf to reach the mouth of the Mississippi. This advantage alone should command the unanimous support not only of the Gulf ports, but of the entire valley of the Mississippi and of the National Government.

The genius of Americans has been manifested in the gradual but remarkable development of an inland navigation which, when complete, — and it is estimated that ninety-five per cent of the circuit is now ready, — will bring a ship from New York to New Orleans without passing into the Atlantic or the Gulf. She may then ascend the Mississippi, and pass round by Chicago and the lakes through the Erie Canal to New York again. The first man who ever cut and navigated a canal exclusively by steam, Mr. Marshall Parks of Norfolk, Va., president of the Albemarle and Chesapeake Canal, tells me that a little over one hundred million dollars would probably cut all the canals needed to take advantage of natural navigation and complete this magnificent circuit. Mr. Parks, whose methods were made available even in cutting the Suez Canal (for French engineers were sent to inspect his works), assures me, that, with a very small force of men, large steam-dredges might cut the Florida Canal, giving a breadth of three hundred feet and a depth of thirty feet, in three, or, at most, four years. Skill and experience for this work abound. The engineers' estimates need not be exceeded; and, whilst the French are cutting the Panama Canal, with the certainty of extending the yellow-fever area, it is hoped the people of this country will contract that area, and favor their great inland and international commerce by securing to this latitude all its natural advantages. Cut the Florida Ship-Canal, and, with common care, New Orleans will enjoy the same immunity from yellow fever as ports on the Atlantic shores. Then the iniquity of fouling Cuba by a constant influx of Spanish soldiers and filthy ships will become more apparent, and lead to measures calculated to benefit the Antilles as much as the Gulf ports and the great valley of the Mississippi. Let us rise from a paltry trifling with a gigantic evil, and in a statesmanlike manner insist on the broadest treatment of so great a question. The efforts of the Auxiliary Sanitary Association are worthy of all praise. Let them be seconded by essential co-operation beyond the narrow limits of this city and State.

Riggs House, Washington, D.C.,
Dec. 2, 1880.

XXXIII.

NUMERICAL SANITATION: A CALCULUS OF SUBSOIL DRAINAGE IN NEW ORLEANS.

By S. S. HERRICK, M.D.,
New Orleans, La.

The researches of sanitarians, particularly of Dr. Buchanan in England, and Dr. Bowditch in Massachusetts, have demonstrated so effectually the relation of pulmonary consumption and the malarial diseases to subsoil water, that it would be superfluous to adduce new evidence on this point. My present object is, to estimate the annual cost of these maladies to the people of New Orleans, and the saving to be effected by under-drainage alone. Our large relative mortality from these diseases is justly attributable to the constant saturation of the soil, the drying of which by tile-drainage might be expected to reduce malarial fevers to one-third of their actual prevalence, and pulmonary consumption to two-thirds.

Let us now continue the calculation by the numerical method.

Average annual mortality from malarial fevers	380
Allow 50 cases to each death, and 5 days of sickness to each case, we have total days of sickness	95,000
Cost of attendance, at $1 per diem	$95,000
Value of time lost by the producing-class (two-fifths of the whole), at $1 a day	38,000
Value of two-fifths of the 380 lives, at $1,000 each	152,000
Cost of 380 funerals, at $30 each	11,400
Total annual cost of malarial fevers in New Orleans	$296,400

Average annual mortality from pulmonary consumption	840
Average disability, 365 days, gives total days of sickness	306,600
Cost of attendance, at 50 cents per diem	$153,300
Value of time lost by producing-class (two-thirds being between 20 and 50 years old), at $1 per diem	204,400
Value of two-thirds of 840 lives, at $1,000 each	560,000
Cost of 840 funerals, at $30 each	25,200
Total annual cost of pulmonary consumption	$942,900

By diminishing malarial diseases two-thirds, we find an annual saving of	$197,600
By diminishing pulmonary consumption one-third, we save	314,300
Annual credit to subsoil drainage	$511,900

The area of the inhabited portion of New Orleans may be reckoned at $2 \times 12 = 24$ square miles, or 15,360 acres. The cost of laying drainage-tiles, on the best authority, would not exceed ten cents per running foot; so that the whole expense would fall within $1,750,000, allowing forty feet between successive rows of pipes. This amount would be returned in less than three and a half years, taking into consideration pulmonary consumption and the malarial fevers only.

But we find malarial complications in most other diseases prevailing here, which add greatly to their severity and fatality. Besides, subsoil moisture has a similar, though less marked, relation to several other diseases, independently of malarial complications, — particularly rheumatism, pneumonia, and bronchitis. It is impossible, however, to make any close estimate upon them.

Returning, now, to the calculation, it is not to be expected that the whole work would be undertaken at once. It should begin where it will benefit the largest number. About nine-tenths of our population are found within one mile of the river, and they would secure most of the advantages of the system at one-half the cost estimated above.

But this area could be further reduced one-half, and still include two-thirds of the population, who would then enjoy the benefits at one-fourth the cost, or	$487,500
Allow that these two-thirds would benefit relatively one-half as much by drainage as the other third, they would be entitled to one-half the above credit of $511,900, or	255,950
The cost, therefore, would be returned to them in less than two years by the saving just indicated.	

The taxable property in New Orleans is assessed at $97,340,000, of which at least $80,000,000 would be found within the six square miles most densely populated. A special tax of six and one-tenth mills for one year on the latter amount would afford two-thirds of our people the benefits of subsoil drainage. An annual tax of slightly more than one mill would complete the work in six years.

Our Auxiliary Sanitary Association have set for themselves the example of providing sanitary improvements of a permanent nature. By expending fifty thousand dollars annually, they would finish this work in ten years. A due appreciation of the above figures ought to bring about that result in half the time.

XXXIV.

YELLOW-FEVER RECOGNITION AND ISOLATION.

By Dr. R. B. S. HARGIS
Of Pensacola, Fla.

To reconcile the interests of the public with the prompt and honest declaration of medical opinion, in epidemic times, is an object of first importance.

Experience demonstrates that the majority of practitioners incline to the popular will, which tends to the most hopeful theories as to disease-importation, until seized by panic. This is more especially the case in mercantile communities.

No question in sanitary science to-day is of more importance than that which treats of the prompt recognition and bold announcement of infection in our midst.

I cannot resist the impulse to say *en passant*, or rather parenthetically, that it has not been many years since, and may be so now for aught I know, when, in the absence of an epidemic yellow fever in New Orleans, few physicians had the hardihood to report the existence of that disease in the city as it appeared at times in a sporadic form; and I may add that the press were under similar restraint. Wrote Dr. M. Morton Dowler, twenty-six years ago: "Commerce is king; and it is no more permitted to any physician to report cases of yellow fever with impunity in the absence of an epidemic, than to foretell and encompass the king's death." This is well appreciated in New Orleans. The laws of the counting-house are inexorable; and the unfortunate wight who takes hold of a sporadic case of yellow fever, and reports it, gets hold of the "Bottle Imp." He is soon given to understand that there is no such case in either the day-book or ledger; and he is appealed to from our most eminent physicians, who have each ten times his practice, and have not yet seen a case. If possible, the disease must be ignored; but it had become quite impossible. In some seasons since 1837 the sporadic cases have become so numerous that they have been reported under different names; and, among others, was the very general appellation of "*febris flava*," on the same principle that gave the craziness of George III. the name of "his Most Gracious Majesty's indisposition."

Painfully do I revert to the yellow fever that prevailed in Pensacola in 1873, when I had the temerity to exercise the melancholy duty of reporting to the Board of Health the first case. For this I was denounced by a prominent citizen, and called "a d—d old fool, incapable of performing the duties of his profession." Of course he did me injustice; but, unfortunate man, he lived

not long enough to become conscious of his error, repent, and retract. He fell the third victim to the monster. Ten days later the disease, as I predicted, became fearfully epidemic. What a commentary on that which may be easily inferred! But let us return from this distasteful digression.

Scared by past events, and especially by the ruin of 1878, the tendency now is to assail the just investigator, and to shrink from the world-wide publication of the earliest cases. In truth, the only danger to the health and mercantile interests of a community arises from mystery, which creates suspicion, and closes the eyes to realities which burst forth amid unreasoning consternation.

How to avoid this volcanic disturbance of intercourse and commerce?

To guard against a pestilence is, in fact, guarding against an enemy. Provision must be made for methodical and unceasing vigilance. It won't do to diagnose cases of yellow fever in "Excelsiors" at city wharves.

What would the public say, if, in time of war, — and epidemics imply periodical assaults, — so loose a watch were maintained that torpedoes might be stealthily introduced in the heart of a city like New Orleans?

The medical profession owes it to itself in this country to render the penetration of an infected ship as difficult as the advance of a hostile frigate. The last is visible; the first is invisible.

Why shall we continue to peril the interests and reputation of Mississippi commerce by conflicts as to rice-fevers and yellow fever? The public must grow more and more distrustful of doctors if these are asked to solve questions which should not arise. My remarks will not be acceptable to the believers in the domestic origin of yellow fever. They are addressed only to that school of medicine which reads history.

The exotic origin of yellow fever being accepted, it follows that ships, and ships alone, can inflict damage by introducing the plague. We are all unanimous in the belief that, as a rule, it is close contact between ships and wharves which endanger a port. It is the foul air of the vessel which is carried in the town, charged with the reproductive and transmissible poison. That vessel is commonly a sailer, and built of wood. In most cases she belongs to the collier class, or lesser mercantile craft.

The interest of this city and the quiet harmony of the entire country are endangered by what? By the extreme susceptibility of people who would deem it interference with trade to overhaul every such vessel, and cleanse it of its foulness. They do not object to huge bills for disinfectants when an epidemic is raging; but the ounce of prevention is deemed unreasonable.

Let it be understood, once and for always, that the sanitarian cannot, if he would, recognize every yellow-fever ship.

One single, unimportant vessel, from a healthy European or other port, may — especially when a succession of healthy years fills our Southern ports with susceptible people — pass up the Gulf from the Caribbean Sea containing yellow fever; and its entrance, with perhaps a protected crew, involves the whole land in the consequences of a disastrous outbreak.

Such an accident must be rendered impossible; and then the results of ship invasions will not be dengue, rice or yellow fever.

The bilious remittents of this region will not excite suspicion of yellow fever any more than they do in the Mediterranean. The Gulf of Mexico is our Mediterranean. Its shores and waters are pure, and cannot be charged with engendering yellow fever. The waters immediately beyond it, in the equatorial calm, are the constant carriers of elements calculated to induce the most malignant and communicable yellow fever. Some of my hearers may dispute this; but, so long as the evidence of self-infected vessels in the tropics stands uncontradicted, it is as foolish not to guard against the dangers from ship-fever as against communication with a decidedly infected port.

It is my desire, on this occasion, to avoid all that may not meet with almost unanimous indorsement; and therefore I shall not discuss the origin of yellow fever, but simply insist on its invisible arrival amongst us in ships. This fact established, and with a national organization to control international commerce, so far as disease importation is concerned, we should henceforth and forever be spared the humiliating exhibition of past years, and especially of the past summer.

It is not my intention to depreciate the value of diagnostic considerations. We suffer in reputation from the quick habits of the most experienced, most capable, but usually overworked, practitioners.

They are not careful to a fault, as they should be, in obtaining thermometric indications, or in watching especially doubtful cases with persistent patience, neglecting for a day all other duties to the urgent one of saving a community from panic or plague.

The pulse, temperature, and the characteristic symptoms of yellow fever, with coincidence of cases, should be noted; and these — not the individual opinion — should guide the boards of health.

Bias and imperfect perception may invalidate even physical data, but these are the surest guides we can claim.

We have to confess that an early case, or several early cases, may be overlooked, or never seen by medical men, because mild; and then the *fomites* surrounding sailors are always unrecognizable.

It is these difficulties, combined with the practical impossibility of tracing the poison in many an infected vessel with an apparently healthy crew, that drives us to the only course which, as rational and prudent sanitarians, we must insist upon.

We are told of courageous commanders, threatened by mutinous crews, drawing a chalk-line, and not only threatening with death, but actually shooting, all who dared to step over it. Only the boldest succeed in times of real danger. Shot-gun quarantine is the brutal expedient of unfortunate lands; but it has proved serviceable. And my injunction as to isolation is, that, in a sense, the analogue of shot-gun quarantine be imposed at a reasonable distance from this continent's shores.

A system of national isolation, not based on quarantine detention, but on ship cleanliness, rigorously enforced at all points, is the only effectual preventive of conflicting medical opinions or damaging interstate dissensions.

To come nearer home, the Mississippi Valley is entitled to protection; and that can only be secured to it by the National Board of Health beyond the mouth of the Mississippi and in our noble Gulf. Its shores are not tarnished by diseases which can be confounded with yellow fever, and they never should be touched by a possibly infected ocean-vessel. It is this treatment of international shipping, demanding only very slight detention for complete purification, which can permanently benefit this country. The less the National Board of Health interferes with State boards of health, the better. The more constant and vigilant it is against our common foreign foes, the better for its reputation and for the nation at large.

XXXV.

YELLOW FEVER AND QUARANTINE.

By GEORGE M. STERNBERG,
Surgeon, U.S.A.

An enlightened quarantine against any disease must be based upon a correct understanding of the mode of origin and transmission of the disease in question.

In such a disease as small-pox, where all are agreed as to the mode of origin and transmission, the rules which should control quarantine restrictions are easily determined and successfully applied. But in yellow fever this very question of the mode of origin and transmission is the rock upon which we split: for, as is well known, the profession is still divided upon this point into two camps; the one claiming local origin of the disease from a combination of atmospheric and telluric influences, and the other asserting that it is transmitted entirely by personal contagion, and, consequently, that quarantine restrictions of the same character are required as in the strictly contagious diseases of which small-pox is the type. The quarantine of the past has been chiefly based upon this idea; and the local-origin men of thirty years ago, who denied the portability of the disease, pointed to the numerous failures of restrictive measures of this kind as evidence of the soundness of their position. But to-day the evidence of portability is so convincing that no one familiar with the literature of yellow fever any longer doubts the fact.

Are we to conclude, then, that the local-origin men, including such illustrious names as Barton, Blair, LaRoche, Nott, Harrison, and many others, were all wrong, and the contagionists entirely right? On the contrary, I believe that the main facts presented by both parties, in support of their views, must be accepted, and that truth will be found to lie between the two. There are two sides to the shield; but those who contend vigorously from a single point of view are not likely to discover it.

That individuals from infected places falling sick with yellow fever in non-infected places do frequently establish new centres of infection, is a proposition supported by overwhelming evidence. Whether in this case the persons who communicate the disease act as producers of the poison, or simply as carriers of it from the infected point where they contracted the disease, to the new locality where they fell sick, in which locality a new centre of infection is established, because local conditions are favorable to the increase of the poison, is a question which I shall not attempt to discuss at this time. The latter view has, however, always appeared to me to be the one most

probably correct, as it reconciles the conflicting facts advanced by both parties. But if we concede the personal origin of the poison in the first instance, and admit, what is held by a considerable number of physicians whose opinion is entitled to consideration, that the disease may be directly transmitted from the sick to the well by personal contagion, we cannot admit that this mode of transmission is alone sufficient to account for the introduction and epidemic extension of the disease in all instances.

On the contrary, we must at least insist upon placing yellow fever with the miasmatic-contagious diseases, such as cholera and typhoid fever, which depend for their extension upon conditions external to the human body, and which, however the poison may originate, are diseases contracted in infected localities rather than from sick persons.

That yellow fever is frequently transported from one seaport to another by ships on which no cases of the disease have occurred, and by persons who are not themselves sick, is proved by repeated experience. One or two recent instances will be sufficient to establish this point.

Yellow fever was brought to New Orleans in 1873 by the Spanish bark "Valparaiso," which sailed from Havana, June 15, in ballast. Arrived at quarantine station June 24; was detained two days, and came to the city June 26. The first case was that of the mate of this vessel, who was taken sick on board, July 4, while she was lying at the wharf. The third and fourth cases were on the river-steamers "Belle Lee" and "Albert Pike," which were lying at the wharf next above the "Valparaiso." I am informed by Dr. Devron that the ballast of the "Valparaiso" was discharged upon the wharf, — a fact not heretofore published.

In 1878 a local epidemic occurred in Madrid, which was of local origin, so far as the first cases were concerned, but which, there can be no doubt, resulted from the importation of the yellow-fever poison from Cuba by returned soldiers, who, with their baggage, were crowded into the same rooms with the young people who first fell sick, to the number of ten or fifteen in a room. These soldiers had themselves suffered from yellow fever in Cuba, or were acclimated by residence there. They were not sick themselves at the time of their arrival, nor was yellow fever prevailing at any of the seaports of Spain: yet they introduced to Madrid, a healthy city in the interior, six hundred and seventy-five metres above the sea level, the subtle yellow-fever poison; and thirty-five residents of Madrid, out of fifty taken sick, fell victims to the disease.

Again, it has repeatedly occurred, that, when the sick are moved from an infected locality, new cases continue to occur after such removal, while unprotected persons, thrown into the closest association with the sick in a healthy locality, very commonly escape the disease. Even so strenuous an advocate of personal contagion as Dr. Cochran of Mobile admits that the yellow-fever poison also multiplies externally to the body. In an able article on the "Theory and Practice of Quarantine," in Circular No. 3 of the State Board of Health of Alabama, he says (p. 206), in speaking of the "Excelsior," "And

now the very same men who had safely made the long voyage from Rio to New Orleans were stricken down with fever. In this case, it seems to me, there is but one possible inference warranted by the facts: and that is, that the infection was stored away with the cargo when the ship was loaded in a far-away South American city; that it lay there in ambush among the sacks of coffee boxed up in the hold during the voyage; that, by possibility, it found a favorable environment there, *and multiplied abundantly;* and that the sailors were attacked by it only when they went down into the hold and disturbed the cargo."

We have had repeated failures to exclude yellow fever from some of our Southern seaports, where the practice of quarantine is mainly based upon a theory of the transmission of the disease by persons; and this is especially true of New Orleans. It is true, that during the last few years the possibility of ship and cargo being infected, while crew and passengers remain in good health, has been recognized by the quarantine authorities, so far as to cause feeble attempts at disinfection to be made. But these efforts have simply shown, what might *a priori* be inferred, that disinfection of a ship is impossible while her cargo or ballast remain *in situ;* and, in view of the facts developed by the carefully recorded sanitary survey of the "Plymouth" by a board of navy surgeons, it may be doubted whether any method of disinfection heretofore practised can be relied upon for the complete destruction of the yellow-fever poison in an infected vessel, especially if she is old, and contains rotten timbers, even when cargo and ballast have been removed.

It is evident that we, as sanitarians, cannot remain silent spectators of the administration of a quarantine based upon fallacious principles, and which does not furnish any adequate protection to the people of the great Mississippi Valley, without a certain amount of criminal complicity. It is high time, therefore, that this matter be thoroughly discussed and ventilated. I am strongly inclined to believe, that, for New Orleans, unrestricted intercourse and the quick despatch of vessels from infected ports would present but few dangers beyond those annually incurred under the present system of quarantine administration. Let us have a quarantine worthy of the name, or none at all. The instances of the "Valparaiso" and the "Excelsior" are sufficient to establish my position as to the inadequacy of the test of infection which has been relied upon; and it is apparent that even this test is not available in the case of vessels having acclimated crews, as is the case with most Spanish vessels from West Indian ports. Yet these vessels must remain the given number of days at the quarantine station; although all experience tends to show that the malignant poison concealed in cargo or ballast or bilge is all the time increasing in quantity, or at least in potency for mischief.

Minor ports, — such as Mobile, Galveston, and Pensacola, which have less commerce and a more favorably located quarantine station, and where public sentiment demands a strict execution of the laws, — having learned wisdom by sad experience, have, for some years past, succeeded in protecting themselves. In what respect their regulations and methods differ from those which

govern the quarantine establishment of the State of Louisiana, I do not know; but, if we are to judge by results, either they are better devised or better executed.

New Orleans certainly has many things to contend with which these cities have not. The numerous water-ways by which the city may be approached; its extended commerce; the strenuous opposition to quarantine on the part of an interested portion of the community; the support given to these opponents by a certain number of physicians who believe that yellow fever is an endemic disease in the city; and, finally, the difficulty of obtaining an efficient administration where politics control every thing, — all constitute obstacles of the most serious nature. Again, vessels coming into this port are necessarily boarded by pilots and custom-house officers before they reach the quarantine station; and these persons have unrestricted intercourse with the city. The quarantine station itself is so situated that more or less communication on the part of persons passing up and down the east bank of the river can hardly be avoided, and within a few hundred yards of the hospital and of the wharf are two or three houses occupied by families entirely outside of the control of the quarantine officials. That there is no serious attempt to restrict intercourse between the station and the city, is shown by the fact that river-steamers are in the habit of tying up for the night at the quarantine wharf during the summer months, when quarantine regulations are in force, and while vessels from infected ports are lying at anchor in the immediate vicinity. How often intercourse occurs between these vessels and the river-steamers in question it would be difficult to ascertain; but, in the absence of any reliable measures to prevent such intercourse, the chances are greatly in favor of its frequent occurrence.

The main question is, How shall these evils be remedied, and the necessary protection furnished? That such protection is possible, witness New York with her extended commerce, and Pensacola, Mobile, and Galveston, with a latitude and local surroundings comparable to those of New Orleans. The conditions of absolute success, I believe, can only be found in a quarantine of non-intercourse with infected places; and it has been clearly demonstrated by Choppin in his paper read at the Richmond meeting of this Association, and by Chaillé in his discussion of this subject in the "Preliminary Report of the Havana Commission," that the probable loss to the commercial interests of the country by such a quarantine have been greatly over-estimated, and are not to be compared with the losses during a single epidemic, such as that of 1878. I quote here the opinion of Cochran, given in his recent article on the "Theory and Practice of Quarantine:" —

"It is very much the fashion nowadays to condemn quarantines of non-intercourse as alike unnecessary and barbarous; and much fervid and sentimental declamation has been expended in emphasizing their enormities. I am entirely unable to appreciate these denunciations, and am quite prepared to take the ground that non-intercourse quarantines are often defensible upon principles of worldly wisdom. They are cheaper and safer than modified

quarantines. No boards of health are needed for their administration, since they open no field for the application of the resources of sanitary science, nor for the exercise of the technical skill of sanitary experts, and require for their enforcement only vigilant sentinels and incorruptible guards, — policemen rather than doctors."

But, before urging the enactment of laws establishing a quarantine of non-intercourse, we must consider the question as to whether some modification of this absolute quarantine may not secure to the country a relative degree of safety, such as will justify some slight risk in view of the results to be obtained. I believe that sanitary science is to-day in a position to indicate methods, which, if faithfully executed, will reduce these risks to such an extent as to make a quarantine of non-intercourse unnecessary. But it must be remembered that a chain has only the strength of its weakest link; and if any link in our quarantine chain is carelessly forged by indifferent workmen, or contains a flaw due to defect in the laws of any particular State, then our chain is comparatively worthless. It is evident that in this matter we require uniformity in the laws, and inflexibility in their execution; which can only be obtained by allowing the laws to emanate from a central authority, and their execution to depend upon persons removed from the domain of politics.

The fundamental principles which I think should be recognized as the basis of a rational quarantine are the following: —

First, All vessels from infected ports should be considered infected, and treated accordingly.

Second, The cargoes and ballast of all such vessels should be considered infected, and treated accordingly.

Third, The passengers and crew, and their personal baggage on all such vessels, should be considered infected, and treated accordingly.

Fourth, Detention in quarantine for a longer time than is necessary to disinfect vessel and cargo is unnecessary and unjustifiable.

Fifth, Experience proves that the thorough disinfection of a vessel requires the removal of her cargo and ballast as a preliminary step.

Sixth, To keep passengers and crew on a vessel suspected of infection after her arrival in port, for the purpose of testing the question of her infection, is an unscientific practice, which cannot be relied upon as a sufficient test when the results are negative, and which is too inhuman to be tolerated in a civilized country, when sickness and death follow such practice.

Seventh, A quarantine station should be considered an infected locality, where only protected persons should be employed, and should be so situated that unauthorized persons cannot readily visit it. During the dangerous months intercourse between it and the places to be protected should only occur when absolutely necessary, and then after due precautions as to disinfection of clothing, etc.

Having stated the propositions upon which I believe a rational and successful quarantine must be based, I shall briefly sketch an outline of what I should consider a model quarantine establishment.

The station must, of course, be accessible, and in the vicinity of good anchorage for vessels; but it should be the first point reached by vessels subject to quarantine, and so isolated as to prevent communication on the part of unauthorized persons.

If it is indispensable that pilots and custom-house officials shall visit vessels before the medical officer at the quarantine station does so, these persons should be subjected to the same restrictions as others who have communication with infected vessels.

During the dangerous months, as soon as a vessel arrives from an infected port, her passengers, with their personal baggage, should be landed at the quarantine station; their persons, clothing, and baggage should be disinfected; and they should be furnished with comfortable apartments and wholesome food, during the time of their detention, at the government expense. If there are cases of yellow fever on board a vessel, all unprotected persons among the crew should be at once removed to the shore; but humanity demands that those suffering from the disease, unless fairly convalescent, or at the very outset of an attack, shall not be disturbed, as this is commonly fatal.

As soon as possible the cargo should be discharged by acclimated employees, and the vessel and its cargo should then be disinfected *secundum artem:* after which the vessel may reload its cargo, and proceed to its destination; or, better still, the quarantine station may be made the line beyond which no vessel from infected ports shall pass, the cargo being sent to the city upon lighters.

These lighters should be expressly constructed for the service, with facilities for moving freight with despatch, and for disinfecting it while on board. By this means the delay and injury to perishable goods would be reduced to a minimum.

Such a lighter as could easily be devised would come alongside a vessel, take out her cargo, and stow it in compartments in such a manner, that, while being towed up the river, it could be thoroughly disinfected, and this with despatch and comparative safety, so far as the introduction of disease is concerned.

If the quarantine station should be established at Ship Island, a point which possesses manifest advantages, it would be desirable to build one or more stanch steam-vessels for the purpose of performing the service of unloading, disinfecting, and transporting the cargoes of vessels from infected ports to their destination, and bringing them a return freight. Such vessels should have facilities for taking care of a limited number of passengers, and rooms specially adapted for the disinfection of their persons and clothing. It is unnecessary for me to insist upon the importance of selecting proper men to administer such a system of quarantine as I have briefly sketched. Finally, I may say that I believe it as much the duty of the National Government to protect the country from the invasion of pestilential diseases as from a foreign enemy; and consequently the maintenance of such a quarantine should devolve upon it, just as the maintenance of forts and arsenals does, and this

without any tax upon commerce, or upon the unfortunate people who are subjected to detention. A great government should resort to no petty measures when she stretches out her hand to protect the people from a serious evil. Let those who are protected pay the cost of this protection, and do not add injustice to unavoidable hardships inflicted upon the commercial interests by making the maintenance of this quarantine a tax upon commerce.

XXXVI.

A NEW METHOD OF EXPERIMENTAL INVESTIGATION INTO THE CAUSE OF YELLOW FEVER UPON THE BASIS OF SIMILAR DENSITIES.

By B. F. GIBBS, M.D.,
Medical Inspector U.S.N.

Mr. President, and Members of the Association, — To consign a theory, such as seems to be contemplated by the above title, to the limbo of indefinite suspension, would be a most natural impulse when we consider the treatises and essays, numbering among their authors some of the most distinguished men of our time, which have been written upon the subject of yellow fever. The writer would invite, very briefly, the attention of even those most disposed to be impatient, to the plan he now proposes for the benefit of science and humanity, which has special reference to investigating the cause of yellow fever, and which is the result of more recent study and reflection than could have been given in the former years of his life, when busily engaged in battling the pestilence in its own chosen fields.

In the first place, when speaking of the yellow-fever "germ," it will be understood that those organisms, microzymes, or albuminoid entities, are indicated which have no normal existence in the human economy, and, if absorbed, produce the disease which we recognize as yellow fever. Their existence, in the present state of our knowledge, it is unnecessary to state, is but a rational deduction. Still, every investigator upon entering this field of labor projects a certain course which is evolved from his reading or experience, having for its object the discovery of the parent cell by which the atmosphere is poisoned. The same has been true of yellow-fever commissions; and, while seeking facts which in a general way bear upon the ætiology of the disease, the probability of finding the microscopic germ has been most apparent in the minds of investigators. With this view, the air, earth, and water selected from certain focal points of disease have been subjected to crucial examination; and, while no discovery has been made thus far of such germinal matter, it is believed, that, were an examination conducted after the plan about to be proposed, our hopes and aspirations would be realized.

The habitat and birthplace of yellow fever has some peculiarities. The latter particularly requires the presence of certain temperature, moisture, exhalations, and is made more complete if the space be confined, as the hold of a ship, and involves the presence of such gases as carbonic acid, carburetted and sulphuretted hydrogen, with some form of organic matter. I state these conditions confidently, from having been present on several occasions at the

birth of the disease in ships, but more particularly on the occasion of its appearance on board the United States storeship "Relief," at Pensacola, in 1863. These gases were present to such a degree as to be distinctly recognized at every hatch in the ship. The organic matter and animal exhalation were offensively apparent. The history of this outbreak was published in "The American Journal of the Medical Sciences" in 1866. It is sufficient here to say that the origin of that epidemic was an imported germ, in all probability transferred to the storeship in freight from blockade-runners, which were captured running from Havana: and the filthy condition of the ship afforded the proper conditions for developing a most malignant epidemic; and as I did then, so do I now, point to those accumulations of filth, confidently asserting that they contained the germs of yellow fever, although they were not distinguished then, and have not been since. My examinations were then made in a crude way, and were fruitless of results.

The constant failure which has attended the examination of the deposits from air of hospitals, ships, prisons, dwellings, or wherever such collections may have been made, it seems to me, has been due to the fact that there was no medium employed of the proper density to contain, carry, or attract the germ or organism. The filtration of the air through gun-cotton or glycerine has not realized the hoped-for result, either because the locality was for the moment barren, or nature was addressed in an incomplete and imperfect manner. We should as soon expect an herbaceous plant to exchange places with a parasite, in the conditions of germination, as we should look for the evolution of yellow fever in the absence of heat, and the nidus of the gases and organic matter before mentioned, which are found where the poison is evolved in its most malignant form. The parent cell, if we may call it such, which is capable of transportation, seems exceedingly heavy, and is moved with difficulty; while the poison evolved from this is moved by the wind several hundred feet at once. Be this as it may, if we wish to secure the germinal cause, the proper conditions must be bestowed upon a known focal point of the disease, so as to surround it for a prolonged period with an atmosphere having an acknowledged attraction for all floating organic matter. This brings me to the point which it is the object of this paper to explain.

The theory here advanced, and which is based upon many observations made in the beginnings of yellow fever, is, that the focal points of origin in the home of yellow fever and in its exported germ are pervaded by gases of a denser character than the ordinary air, and always impregnated with animal or ammoniacal odors. This was particularly the case in the ship above referred to, and from which, as a focal point, the disease spread in every direction not restrained by rigid quarantine. With my present convictions, I feel that no better place can be found than a ship for seeking the cause of yellow fever, let the principle or organism be what it may; and, while I may be able to point out the way, it will probably remain for some one else to make the experiment.

Supposing our experiment is to be made upon a ship whose hold is foul,

and wherein the disease has been evolved and exhibited among the crew, our first effort is to bestow upon the atmosphere of this hold all of the conditions in an extreme degree which are known to favor the evolution of the yellow-fever germ, such as a temperature of 80° Fahrenheit, which should remain constant for a week, with the addition from time to time of carbonic acid gas, carburetted and sulphuretted hydrogen, and the odors arising from decaying animal matter, and to which moisture shall be added so as to preserve the air at 80°, 100° being saturation.[1] In short, we convert the hold into a "culture cell." After treating the air of the ship for a week as above, and the germinal matter is supposed to have become fully developed, our next object is to float this heavy germinal matter, this being the character of yellow-fever poison, as already shown. Without disturbing the cargo, I know of no better plan than to supply a still denser atmosphere, and so accomplish this object. We have in carbonic acid gas a medium exactly suited to our purposes, and which possesses the additional quality of taking up organic matter. Without being positive in the matter, it seems fair to conclude, that, between the density of this gas and the specific gravity of organic matter, there must exist some similarity, and which would account for the manner in which the latter is suspended by the former. Such peculiarities in the character of carbonic acid gas we wish to avail ourselves of in seeking a means of collecting the parent germ of yellow fever. This, in my opinion, would be accomplished, whether such germ be floating, or attached to decaying or fermenting matter.

The carbonic acid should be introduced in sufficient quantities to keep the vessel full up to the spar-deck. By requiring this gas to remain in the ship for twenty-four hours, it will descend to the bottom of the ship, and enter any avenues open to it, with an undoubted tendency to float upward any organic matter of the same or less density than itself. The above period having elapsed, we are now prepared to remove the carbonic acid gas with all it may contain.

How should this be done so as to be certain of perfect filtration? Some would prefer that it should be done through glycerine lodged on the diaphragms of wire gauze or on finely perforated plates; others, that the gas be passed through gun-cotton. I would use either in the course of the examination, but primarily the gun-cotton, because it is a known fomites, and the objection which may be urged against glycerine on account of its known solvent action.

In reference to the precise plan of proceeding in using the cotton, I would fill a hundred glass tubes with it, properly restrained with wire at both ends, so as not to be drawn through the tubes when the suction power is applied. These tubes I would support at each end by two boards placed on edge, properly provided with holes, through which the tubes would be passed and securely cemented; the whole to be enclosed in an air-tight box, so that the opposite ends of the glass tubes may open into two different closed compartments of the box. One of these closed compartments is to be connected by

[1] This last condition in the presence of the temperature indicated would naturally exist in a ship in the tropics, and in more northern regions with the wind from seaward.

a pipe, which shall extend to the bottom of the hold of the ship, and the other compartment with a bellows or pump, or other aspirating machine, so that the gas may be slowly extracted from every part of the ship. The hatches should be closed during the operation, and the aspiration should cease as soon as all the carbonic acid gas shall have been removed. The motive power should be by a steam-engine, so as to insure perfect regularity. A small pumping-engine would be sufficient to set on the deck of the vessel.

The gas having all been removed, the box containing the tubes is now opened, and the tubes are securely corked and sealed for future use under the microscope. The cotton may now be made to yield up whatever it may contain, and deposit it upon the wire gauze or perforated plates covered with glycerine, by aspirating carbonic acid gas through the tube in a direction contrary to that by which it was passed when received from the ship. Should one tube fail to give results, another may be used, etc.

In advocating a theory which seeks a solution of the difficulties which beset the separation of the poison producing yellow fever, the argument of similarity of densities may be more fully stated. Any one will admit the truth of the statement, that, in the economy of nature, the sporules of plants bear a relation in their specific gravity to that of the air, which fixes the fact of their limited or extensive distribution. In other words, whenever sporules are intended to float indefinitely in the atmosphere, as in the case of those of the *lycoperdon* (the common puff-ball), they have about the same specific gravity as the medium in which they are set free, and disappear in clouds. Sporules of a greater specific gravity float closer to the earth when moved by a disturbing force.

This difference in density of an organic germ may be given greater buoyancy by providing a medium of greater density at which it may float. In using carbonic acid gas, it is plainly evident that a germ-cell would be sustained that ordinarily falls to the ground. The proper filtration of this gas should then give us the parent cell we seek. So, without further argument, it may be conceived how similarity of densities, supposing the yellow-fever germ and carbonic acid gas to resemble each other in this respect, may become the most important consideration in collecting the germinal matter which fails to appear in ordinary air filtration, on account of the greater density of such matter, however carefully it may be sought at its point of solution.

All of the more modern writers upon yellow fever agree upon this fact regarding the yellow-fever germ, that it never rises more than a few feet above the surface of the ground; and this was insisted upon with great force by Dr. Nott, formerly of Mobile, Ala. Dr. C. B. White of New Orleans gives its rate of progress when undisturbed.

The worst that can be said of the plan which is here outlined is, that it may fail, like all other methods of investigation. But when we attempt an interpretation of the works of nature, or an investigation of her operations, the questions should be skilfully and perfectly addressed. It is only a rational deduction which is derived from a fair consideration of the peculiarities of the

beginnings of yellow fever, and the conclusion would seem to favor a successful result.

There is a well-recognized peculiarity regarding organic matter evolved in confined spaces, found floating in the air of ships and hospitals, which is, that there seems to be an intermittent emission, and this, as it were, in clouds. This fact is known only through the sense of smell, as we find at times these spaces comparatively free of the well-known odor.[1] Having this knowledge, it would be unfair to expect the germinal matter of yellow fever contained in the hold of a ship to become suspended in the carbonic acid vapor if there were no ripening cells or sporules, although at the same time it is highly probable that any cell-growth may submit to its density and be carried off at any time. It is fair to suppose, that, if a puff-ball can increase its size two thousand times in a single night, and whose origin is a most delicate mycelium, such a growth must be surrounded by the required conditions, whatever these may be; and in like manner the propagation of yellow fever is secured, if the germ and proper environment is provided, and is, so to speak, quickened into activity in a single night. Moreover, if, like the spores of fungi, the poison of yellow fever fills the air, and is invisible, there must be an origin, a source from whence the aërial poison proceeds. That it has an interrupted emission from its nucleus is highly probable, from the fact that we find persons escaping in one epidemic and taking the fever in another.

If there is a parent growth of this invisible, floating, germinal matter which is so minute as to have hitherto escaped observation, and its density is not greater than that of carbonic acid gas, it is believed, that, by the plan proposed, it may be floated and collected by this medium, and be caused to lodge by the aspiration described on the gun-cotton contained within the tubes.

In addition to the value of this plan in collecting the aërial poison which may be the result of septic fermentation, as is now believed regarding yellow fever by many intelligent investigators, the use of carbonic acid gas may be still further extended in collecting the organic germs of other contagious and filth diseases; but enough has been said to show the importance of this gas as an agent in collecting organic germinal matter.

EXPERIMENT DESCRIBED.

The only experiment I have to give in corroboration of the above theory is in the following, which was several times repeated; viz., two transparent, glass-stoppered bottles were filled at the same time, by means of a Davidson's syringe, with the air of a room which contained in abundance the particles shown in the solar beam. One of these bottles was sealed, and the other filled with carbonic acid gas. The jar containing the latter gas, after standing some time, was so coated with the floating air-particles on its upper inner side as to completely obscure the glass, which was before highly transparent. The jar containing only the air of the apartment had distributed evenly upon its

[1] Hygiene and Public Health: Buck. Vol. i., p. 629.

inner surface these air-particles which were shown in the solar beam. On the bottom of both jars was deposited the heaviest of the air-particles, which seemed from their iridescent color to have been particles of coal-dust or ashes, and which even the carbonic acid could not float. This experiment seems to support the theory above advanced, and I am sorry to be unable to have the jars with me for exhibition here.

XXXVII.

REPORT ON YELLOW FEVER IN KEY WEST, FLA., IN 1880.

By F. W. LESTER, M.D.,
Of Key West.

Mr. President, — In response to an invitation to prepare a paper on the late epidemic in this city, I have endeavored to accomplish the responsible task assigned to me. Embarrassing and difficult as it would be under the most auspicious circumstances to do full justice to this subject, I have been unfortunate enough to have had only a few cases of fever in my own practice, although I have seen a large number in the practice of Dr. Harris. In view of this fact I crave your lenient judgment for the very imperfect manner in which the duty imposed upon me may appear to have been performed. The subject is one full of value and interest, not only to the medical profession and our community, but to the world at large; for this truly terrible disease, which has enveloped many a noble and fair city in sackcloth, and made desolate many happy homes and firesides, and driven the sharp iron of sorrow and agony to thousands of loving hearts, has also been the incentive to active exertions of philanthropy, self-devotion, and self-sacrifice. Its discussion has drawn forth the highest feelings, the talent and views of the most learned of our profession. In thus presenting this subject I hope to be just to all, and to allow such conclusions to be inferred as may present themselves to the minds of individual readers.

Before I proceed to the study of the disease, let us glance at the geological formation of the city and its sanitary condition. Key West is an island about seven miles long, having an average width of one mile and a half, and an elevation of twelve feet above the level of the sea. The city is located at the west end of the island, and has a population of about twelve thousand, about one-half of which are Cubans and negroes, the former known all the world over to be especially prone to disregard sanitary laws. There are certain topographical features of the island bearing most important relation to, at all events, one of the factors especially concerned in the epidemic, and to which I shall now direct attention. The northern part of the city is built on made land, which was, previous to its filling in, very large ponds, connected here and there by narrow strips of land. The material used to fill in these ponds was *débris* from the streets. The ground being low and porous in this locality, the soil is kept constantly wet in places by the heavy rainfall and tide-water: and the privies, which are very numerous in this region, are simply shallow pits, which, in many instances, have to serve the purposes of from ten

to two hundred persons; especially is this the case where there are cigar factories. A moderate regard for health and cleanliness would suggest the cleaning out of these places four times a year; but, as a general thing, they are emptied or cleaned only once annually. The result is, that they very frequently overflow, saturating the surrounding ground with disease-breeding contents, and probably sowing the seeds of some terrible epidemic. Another prolific source for developing foci of disease is the accumulation of filth around and about the Cuban restaurants in this same region. A gutter to answer the purpose of a drain was made some time ago through Green Street in this area: but, in a sanitary point of view, it was considered to be the *bête noir* of Key West; and therefore the health officer ordered it to be filled up last summer on a level with the street. There is a ditch on Simonton Street, covered with boards, widely apart: it serves to drain the water from the central part of the city; and, just as it reaches Green Street, the most offensive effluvia arise from it. On the east side at the foot of Green Street is deposited all the garbage of the city, which is largely composed of organic matter, and is very offensive. There can be no doubt that the public health may be and often is impaired by this cause. But, lastly, the exhalations from the pig-pens, which are scattered all over the city, are another potent factor in the causation of disease.

The most startling fact, however, that confronts us, is the absence of intermittent and remittent fever where such local conditions obtain. I have yet to hear of a single case of such a fever that originated here.

Having inquired into some of the more special and important factors concerned in the local origin of the disease, I will pass to the consideration of some of the other conditions which may have entered into the causation of this epidemic.

Communication is constantly had between Key West and the islands of Cuba and the Bahamas. I need adduce no facts to show that yellow fever and other infectious and contagious diseases exist in Cuba in all months and all seasons of the year; for it is universally conceded to be so: nor can there be any doubt as to the portable nature of specific germs or infection. This, however, cannot be said of the Bahama Islands; for, excepting yellow fever, they are generally considered to be healthy.

The foregoing facts comprehend the prominent points relating to the local status on the one hand, and show the probable, possible, or actual opportunity for the exotic introduction of special morbific elements on the other.

I shall now attempt, from this data, to trace the commencement and progress of the epidemic. On the 9th of July the American schooner "Competitor" arrived at Key West, five days from Rock Sound, Bahamas. Amongst her passengers was a Mrs. Adongia Bastiono, who had recently lost three children from fever. She is unable to give any account of the disease other than that her children vomited a black fluid, and turned yellow before dying. She brought with her the mattresses, bedding, and clothes used by her sick children, but claims that she smoked every thing used by them. On closer

questioning, however, she declares that the things were destroyed; but this contradiction proves beyond a doubt the fallacy of her statement, her desire to escape blame. On her arrival Mrs. Bastiono took up her residence at the house of her brother, William Carey, who lives on Grinnell Street, not a great distance from the United States barracks. This locality has always been in a good sanitary condition. On the 16th of July, a week after the arrival of Mrs. Bastiono, Fletcher Brady, living on the same lot with her, was taken sick. He was very intimate with the family, and was frequently in their house. He was attended by Dr. Harris, to whom I am indebted for the following information: Brady was attacked with high fever, and complained of violent pain in head and back, pulse very rapid and bounding. His tongue was furred, and there was marked injection of conjunctivæ. Later his tongue became dirty in the centre, and very red at the end. The third day he vomited a light, slimy fluid, mixed with bile. The doctor did not test the urine, nor did he keep a record of the temperature, but says that it reached its height on the second day, and then gradually fell. Brady recovered: diagnosis, "congestive fever." A large number of similar cases occurred in this locality. In the month of September the disease assumed a malignant character, and seemed to spread very rapidly. Dr. Harris informed me also that Mary W. was taken sick on the 5th of September with high fever, and pain in head and back. On the third day of her illness she had a bloody stool; delirious on the fourth; died Sept. 10, having vomited a dark-colored fluid. After death, bled from mouth and nose: diagnosis, "congestive fever."

Until the death of George McClintock, Oct. 3, — which, Dr. Perry informs me, was a typical case of yellow fever, — the prevailing fever had been diagnosed under various synonymes. Every case of fever occurring afterward was diagnosed yellow fever.

On the 4th of October the disease began its ravages at the United States barracks; and, of the eight cases attacked, only two recovered. With regard to these cases the physicians of Key West are unanimous in the opinion that they were genuine yellow fever.

The cases I saw with Dr. Harris were essentially a fever of one paroxysm, lasting from a few hours to four or five days. No regular temperature observations were made; but, from the statements of Dr. Harris and my own observations, I am satisfied that the fever is not characterized by remissions or intermissions. The highest temperature observed by me was 104 1-5 (second day of disease). At the outset of the attack the eyes are congested or jaundiced; gums bright red and swollen; tongue furred; more or less constipation; highly colored urine; skin usually moist and perspiring; pulse soft and not very frequent (in four cases, second day, I counted it a hundred). Slight pain in head, back, and loins at commencement of attack; afterward no pain was complained of, except some epigastric distress. There was bilious vomiting at the outset in some of these cases. In others no vomiting occurred. In some of the fatal cases there was a suspicion of black vomit. Dr. Harris had not discovered any albumen in these cases.

But the more formidable and typical cases were not as above described. In these the pulse was full and bounding, — varied from 110 to 140, or even higher; the temperature ranging from 104° Fahrenheit to 105 2-5°. The skin was either moist, or dry and inactive, gradually putting on a jaundiced color; the eyes were suffused, and, as the case progressed, thoroughly yellow; thirst very urgent, and tongue sustaining the dirty-brown appearance. The stomach, in these cases, was more or less irritable from the commencement; and a fatal termination was often preceded, at a more or less distant period, by the appearance of black vomit, which so characteristically marked this disease in its fatal form. In the case of Hance Gibson (unacclimated) the urine was highly albuminous, and suppression occurred several hours before death. There were present, in a good many cases, restlessness, more or less insomnia, and sometimes delirium.

XXXVIII.

NATURE, CAUSE, EXTENSION, AND RELATIONS OF DENGUE, OR BREAK-BONE FEVER, IN SOUTH CAROLINA, SUMMER OF 1880; ALSO CONTRASTED WITH YELLOW AND MALARIAL FEVERS.

By F. PEYRE PORCHER, M.D.,
Charleston.

The following questions have been assigned for our consideration: (1) The subject of dengue; (2) Its supposed causation; (3) Its relation to yellow fever; (4) Its differential diagnosis; (5) Its relations to malarial fevers.

There are some subjects, like the origin, cause, and exact nature of yellow fever, or the nature and operation of malaria, for example, which will constantly, perhaps, elude our search; yet we must never remit our efforts: and, where we fail to explain every thing satisfactorily, we can at least content ourselves with Sir Thomas Browne's most useful rule, "Where there is an obscurity too deep for our reason, 'tis good to sit down with a *description*."

We can hope to present but an imperfect response, on account of our own deficiencies; and possibly because, as was before implied, the subjects proposed do not admit of a ready *solution*, but only of a *description*.

The variety of dengue, or break-bone fever, which existed in Charleston and in some other portions of South Carolina, was barely sketched in a report made to the National Board of Health, and published in their Bulletin for Sept. 25, 1880. We shall avail ourselves of this whilst adding materially to it, because it describes the epidemic as it existed, marked as it was by great variability as regards most of its symptoms. Fever, pain, and some prostration were the only characteristic and constant features.

The epidemic in Charleston was comparatively a mild one. In the opinion of some of the physicians who have taken a retrospective glance, some cases were seen as early as the beginning of June; and there is a report of cases having been seen even in March (Dr. H. W. DeSaussure), though the disease was not generally recognized till the middle or end of July.

Dr. Meyer, who lives and practises much in the north-east section of the city, reports to us that his first cases were seen, June 20, at the corner of Cooper and Hanover, near new-made streets. He is sure that the dengue had its point of origin there. These are the earliest cases we have any positive note of in South Carolina.

It began, it appears, in the extreme north-eastern portion of the city, above Calhoun, near Cooper and Hanover Streets, in what was formerly called the "Neck." Afterwards it made a gradual progress (as yellow fever has done

before, but in the reverse direction) into the lower or oldest part, and slowly diminished until its apparent complete disappearance (Nov. 25);[1] thus also obeying the rule observed by yellow fever, that frost or ice destroys its germs, or at least its potency.

The earth had been disturbed in the paving of the road-bed of King Street, an extensive thoroughfare running north and south the entire length of the city; and the special section where the first cases were noticed was not in as good condition as others, being near the marshes, and new streets having been opened there: but, though we were at first inclined to search for the causes of disease in these conditions, the simultaneous appearance of the fever in the South-West, and, as we learn, in Savannah and Augusta, and even in Egypt, — which is isothermal with us, — must exclude such a supposition, and refer it to general and wide-prevailing atmospheric influences, confined apparently to the southern sections of the United States. (It will be seen *infra* that we have subsequently found it advisable to reconsider the influence of certain local insanitary conditions existing in this city as possible causes of the disease.)

Besides our own experience, we have made diligent inquiries of many persons, — of physicians as well as of the laity, — and learn the following particulars: The symptoms vary exceedingly, — some being present, and some absent, — as follows: The disease generally begins with a feeling of coldness or by a chill, followed by a fever; this, with a temperature ranging from 100° to 105½° as extremes, lasts generally from twenty-four to forty-eight hours, occasionally extending to four or five days, and even, in rare cases, to seven. Relapses occasional, specially in those who have gone out too early. Headache frequent, generally frontal, from the beginning. Miliary eruptions, sometimes elevated and red like measles; sometimes a mere blush, like scarlet fever; in others resembling erythema, with the occasional presence of sudamina, over the face, neck, and body; sometimes the eruptions were confined to the body, and endured for days after recovery. We have seen some examples of slight desquamation, furfuraceous or branny in character. In some there were no eruptions. Sweating was profuse in many persons, though *often absent.* The sweating would recur for several nights, even when the parties went to bed apparently well. Hence some physicians are inclined to consider the disease to be *suette miliare* of a mild form. "Break-bone" is the best name, because pains in the bones and the limbs are the most constant symptom. There is often great restlessness during the fever, and occasionally fugitive delirium at night. In a boy under our care insanity resulted and lasted three weeks with recovery. In some a feeling of congestion or tightness about the throat, with bleeding from its surface, existed in a few cases known to us. Catarrhal symptoms are rarely present, although cough has occasionally existed. Bleeding from the nose, not unusual in children, and also increase in the menstrual molimen, have been observed. Pain in the back and limbs markedly present, but no decided swelling of joints, no carbuncular enlargements or boils or abscesses, as in the epidemic of dengue of 1828, and in that of "break-bone"

[1] First ice of season in the city, Nov. 25.

which followed in 1850. In the last mentioned, there was special tenderness about the scalp not noticed this season. Weakness and prostration have been very decided, but not nearly to such an extent as in some of the previous epidemics. The bowels are costive at the beginning, as in all fevers. Physicians consider that there has been a tendency to hepatic torpor and congestion, of no great severity, however. We have heard of no cases of decided jaundice; nausea sometimes occurred; vomiting not so infrequent. The tongue, in our cases, was sometimes slightly red at the point and margins, and often very much loaded and furred, with greatly diminished appetite till convalescence. The dengue did not resemble "gastric remittent fever."

The disease does not affect all the members of a household; oftentimes only one or two being seized, though we have known six to be taken in one house: in this respect differing from the dengue (1828) as described by Professor S. H. Dickson, and from the epidemic seen by us some thirty years since (1850). Then 5,000 to 10,000 were down. No one was well enough or strong enough to help his neighbor, and one had to learn to walk over again.

It is difficult to calculate the number who have suffered, as very many have not employed a physician. From 4,000 to 5,000 perhaps approximates the number.

Very little active treatment has been used, — as far as we can learn, as follows: A mild laxative, mercurial or saline; febrifuge mixtures, with tinctures of aconite or gelseminum and acetate or citrate of potash and nitre; pediluvia, sinapism, etc.; and quinine during and after the attack, upon theoretical grounds, with occasionally mild stimulants. Some favored the use of Dover's powder, and hot baths were found to relieve the pain. We used occasionally cold sponging to the head where the fever was high. Several persons have recovered with no treatment whatever, attending to their business as usual, though with some discomfort.

It has prevailed among both races, perhaps equally; and *scarcely a single death is ascribed wholly to this disease*, as far as we can learn.[1] The chief disadvantage which accrues to those who take it is the time lost, and the temporary pain and weakness from which they suffer. The sequelæ, however, in a few were troublesome and persistent, some of the sufferers not recovering for weeks.

Two persons, whites, under our care, were seized within three days after entering the city. One of these occurred Oct. 25.

Persons who were in the city, and who visited the country, had mild attacks. We know of four such, and there were many more. One of these had reached Asheville, N.C., where we saw him. The disease was not communicated to any one there. Cases of the fever occurred in Summerville, thirty miles off, on the line of the South Carolina Railroad, among persons who had never visited the city. Others sickened there, who had paid flying visits to the city, remaining a part of a day only. No other disease existed at the time in either place.

[1] Three or four deaths may have occurred where break-bone was the initial disease, with complications. Dr. Rhett reports to us two such in Summerville.

A series of questions were forwarded to us, in common with others of the profession, by Dr. John Forrest, secretary of the Medical Society of South Carolina, in order to elicit information. We condense from ten or twelve responses, which we were kindly permitted to inspect, a few particulars: The fever is one of paroxysm, with occasional remissions and relapses. The pulse was slower than ordinary in some instances (48 to 60), temperature in one case falling to 97°. There was sometimes great nervousness, delirium, hallucinations, and nervous tremors, even affecting the hands; hemorrhages from the nose and fauces, and even from the eye, one physician reports; the skin dry at first, sweating afterwards; a few miscarriages occurred; no boils or carbuncles were observed; swelling of the joints reported in two cases. There were several who had premature labors. It is commonly called "dengue" or "break-bone," though not corresponding fully to previous epidemics.

How different all this is from yellow fever, in which a fever after the initial stage, of no great apparent intensity, produces great changes in the blood and tissues, black vomit, albuminuria, and frequent deaths!

LOCALITIES AND EXTENSION OF DENGUE.

By letters from physicians received by Dr. Forrest, which we have inspected, the disease has not been seen at all in Mar's Bluff, Camden, Winnsborough, Chester, York, Lancaster, or Spartanburg.

In reply to our own letters, Drs. Turnipseed and Taylor state that it was epidemic in Columbia in September, the first cases seen being among officers of the railroad (Taylor). We learn from Dr. T. G. Croft that it has also existed to a slight extent and in a mild form in Aiken.[1] But dengue, it will be observed, in making ever so slight a lodgement in Summerville, Columbia, or Aiken, has invaded regions never visited by yellow fever; Aiken being, perhaps, wholly free from malarial, likewise.

Dr. O. H. Ott writes us from Branchville, a small and scattered village at the junction of the South Carolina and Augusta Railroads, "We have had, this fall, a number of cases of break-bone here. It occurred in different families in the town, but whole families were not affected. It did not become a general epidemic, nor did it extend into the country."

Dr. A. I. Wolfe of Midway (between Branchville and Aiken on South Carolina and Augusta Railroads) writes us, "I beg to state that I met several cases of break-bone this season. I was somewhat puzzled at first, as there was much malarial fever existing at the time. I did not regard the disease as epidemic, but rather accidental or sporadic. It disappeared as suddenly as it had invaded, and was of an exceedingly mild type, except in two or three cases which assumed the form of acute *articular rheumatism*. I learn that it appeared at Blackville, Bamberg, and other little towns on this line of railroad;" that is, between Midway and Aiken.

[1] At the end of the season (Dec. 11), Dr. Croft writes us as follows: "We have had a good many cases of the fever, and most of it originated here, — some few cases brought from Augusta and Charleston; and I think they were the first we had. My first case came from Charleston. There must have been two hundred cases in Aiken."

Dr. H. M. Stuart reports forty or fifty cases in Beaufort and Port Royal, — towns where yellow fever has existed. But we are indebted to Dr. Stuart for a letter giving us an authentic account, and which may assist in tracing the extension of the disease. It is dated, —

"BEAUFORT, S.C., Nov. 23.

"The first case of dengue that I saw was on Sept. 7. At the time I did not note it as such, there being no peculiar diagnostic symptoms to mark the disease. It was a fever of one paroxysm, lasting three days, accompanied by great distress and nausea, not much pain, and followed by great depression of spirits, etc.: no eruption. I now consider it as having been dengue. Previous to this (on the 6th, I think), a sailor, running in a small boat to and from Savannah, had a fever lasting two days (I saw him on the second day): nothing peculiar about it, except I do not think the fever returned, although very little quinine was given.

"Up to the commencement of this fever our town and Port Royal were remarkably healthy, no sickness of any kind prevailing. I hoped at one time we would escape the dengue, as it was prevailing in Charleston, Savannah, and Augusta so long before it appeared with us. By far the greater portion of our inhabitants have had it, — one or two cases a second time; and even now I am attending an aborted case. I mentioned in my answers to the questions sent by Dr. Forrest that I had attended about fifty cases. There were others that I did not note among negroes. I gave quinine in the first two cases, but in no others, — finding they were better without it. I am sorry that my ideas in regard to the origin are so undefined.

"I heard that one or two cases of fever were at Port Royal about the week previous to the 7th. Some of these had come from Augusta. Did not see them: they were slight. Cannot say that it was dengue, or that it originated there. A great many cases were so slight, a doctor was not consulted: consequently it may have been in Beaufort (and Port Royal also) among the negroes a short time before I saw it. However, I saw it in both places about the same time.

"Owing to the protracted drought (so protracted that some ponds were dry that were never so previously in the recollection of the oldest inhabitant), our cisterns were all dry for a considerable portion of the summer; and our wells (which contain good water, although a little hard) were very low, but remained good throughout. (See the important influence of extreme drought referred to *infra* in this.)"

Dr. Bailey of Georgetown, S.C., reports its presence there as doubtful, or mixed up with the prevailing malarial fevers. Dr. H. R. Rutledge writes us, under date of Nov. 24, from Greenville, S.C., in the extreme northern part of the State, "Not a single authentic case of 'break-bone fever' occurred in Greenville during the past summer. There were some vague rumors of such discussed, but not substantiated." Dr. Wood of Wilmington, N.C., writes us that the disease has been seen in that city to a slight extent. Dr. J. G. Thomas[1] of Savannah informs us that it appeared there about the

[1] We take the liberty of copying from his letter under date of Nov. 24: "I still see an occasional case, but think it only in those who have been here for some time. We have not yet had ice, that I am aware of, though there have been white frosts. I am very curious myself to ascertain if cold will arrest the complaint. The epidemic here had spent its force [as it had in Charleston, likewise] before we had any cold weather; and I have been afraid that it might linger even after winter had set in."

15th of August. From Professor H. F. Campbell of Augusta, Ga., we have been favored with the following: "I have been unable to learn where the disease first appeared. I feel quite confident that it is imported, and did not originate here. The first cases were noted either very late in August or the beginning of September. It must have become epidemic at *once*. The first I heard of it was that there were many cases. I do not think the disease spread much beyond our city limits, that is, by continuity, so to speak; but we had it along the lines of railroad, and there were many cases of persons who had visited Augusta and slept here."

We have heard but a single expression, based on personal observation, given to the opinion that it can be conveyed from the sick to the well.[1] *Per contra*, we know one example of a physician who daily visited the city, but residing in Summerville, and, sleeping with his children while suffering from the fever, none took it.

We think that dengue, once originating from a local cause, or by any circumstances favorable to its extension, spreads very much like yellow fever, not by communication or personal contact with the sick, but possibly by the conveyance of fomites in the clothing, trunks, cars, etc; that it is infectious, and is diffused by gradual tainting or contamination of the atmosphere itself, the generation and multiplication of cases intensifying the poison more and more; and this aërial contamination advances along the main line of travel and human intercourse. This last is, we think, clearly established.

First seen in this State in Charleston (middle or end of July, or earlier), it advanced evidently from the northern portion of the city, where it began, to the southern. This, also, was its last stronghold; and strangers who visited the city late in the season were more likely to take the fever if they resided there. It next appeared on Sullivan's Island (September), in Beaufort and

[1] This is from Dr. Benjamin Rhett of Summerville; and, as the subject is interesting, we append a portion of his letter to us: —

"SUMMERVILLE, S.C., Nov. 9, 1880.

"I will give you such facts as I have bearing upon the points you mention. A. M. Jones, carpenter at the South Carolina Railroad workshop in Charleston, came to his home in Summerville laboring under a mild attack of 'broken-bone fever,' so called. A few days after his convalescence, his wife, who had not been to the city, sickened, and had this fever very severely. — Mrs. W. came to Summerville, with the fever still upon her, to her son's, to be with his wife in her 'confinement.' The son, who works at the Charleston Mining Company's mines on Ashley River, sickened in a few days: the eruption made its appearance on his hands and arms. Two of his children, who had not been out of Summerville, were very sick with the same fever. — Mr. Averill, master of trains S. C. Railroad, came to his home in Summerville sick of the fever, taken in Charleston. After his recovery, his wife, who occasionally went to the city for a few hours, had the same fever; and, since frost, one of his daughters has had the fever, which has left her somewhat jaundiced. I have seen but two cases subsequent to frost. The nervous disturbance was a peculiar feature of the disease, producing great restlessness, and in some cases tremor of the hands."

It should be remembered that Dr. S. H. Dickson, whilst referring to the dengue of 1828 and of 1850, considered the disease "epidemic and *contagious*." "As to the personal transmission, it is as well made out as it can be in examples of pertussis and mumps, and other maladies which generate no palpable matter." — *Elements of Med.*, p. 736.

Port Royal (about Sept. 7) ; then gained ground along the line of the South Carolina Railroad, reaching Summerville early in August ; Aiken, and lastly Columbia (middle of September), by a slow progress ; never getting as far as the other towns cited above, which were farther removed from or not directly on the main routes by rail ; nor was it found in villages and hamlets off from these routes. For example, cases of break-bone occurred on Sullivan's Island, in August, in persons who had visited or who came from the city. We are informed by a physician of experience, from his personal knowledge, that such cases did not at first spread to other members of a household who were seized later in the season, when the disease became general, thus strengthening our opinion that the disease is infectious.

In accordance with these views, had the warm season lasted longer, dengue, which invades slowly, might have reached Greenville, Spartanburg, and Abbeville. In Wilmington, N.C. (which is coterminous with or just north of the limit to the growth of the "palmetto"), it prevailed to a very slight extent : date of first cases not stated by Dr. Wood.

With regard to Key West, Fla., we await replies to our letters for information but recently sent ; but the following, taken from the Bulletin of the National Board of Health of Oct. 2, deserves our attention, and in connection also with the subsequent outbreak of yellow fever in that town : —

> Key West, Fla. — A despatch from the health officer, R. J. Perry, dated Sept. 21, states that no yellow fever is known to exist at that port or in its vicinity. Some thirty or forty cases of a mild form of dengue fever have occurred during the past two months among the native children.

If dengue originated in Key West, it is not likely that it was the centre from which New Orleans, Savannah, and Charleston were infected. We await more precise information, which will doubtless be elicited at the conference in New Orleans.

The following interesting letter we have since received from Dr. R. I. Perry, dated Key West, Dec. 8 : —

"Your letter of Nov. 28 received. The first case of dengue which came under my observation was about the 15th of September. The case of yellow fever, reported by me to Dr. Turner as having supervened upon relapse in dengue, terminated fatally on Oct. 3, and was the first case of yellow fever that was reported from here this summer. During the latter part of July, and the months of August and September, there were reported a number of cases of fever, generally of a mild type, principally among the native children, to which no distinctive name was applied by the attending physicians until after my telegraphic report of yellow fever as before mentioned : then all the cases, if fever was present, were pronounced yellow fever. Draw your own inferences.

"I greatly incline to the opinion that the majority of the cases reported from Key West this summer were either dengue, or a type of malarial fever dependent as to origin upon our local surroundings. Our weather during the sum-

mer was peculiar and unusual, such as to engender malarial diseases of more or less typhoid tendency.

"We have had, say since Oct. 1, several well-pronounced cases and deaths of yellow fever in unacclimated persons. As to what possible or probable connection there may have been between the two diseases, I am unable to say; but, when I have more time at my disposal for careful investigation, I may learn more about it."

The late Dr. W. C. W. Glazier, who died of yellow fever on the 12th of December, while in charge of the Marine Hospital at Key West, wrote to us on the 7th of December as follows: —

"There have been no cases of dengue, reported as such, in this place, excepting that the first case of yellow fever officially reported was said to have 'degenerated from a mild form of dengue.' In my conversations with physicians who have had a considerable practice in the city, I have learned nothing of the peculiar pains or eruption of that disease. . . . It is very difficult to arrive at any conclusion in regard to the sickness here this summer. The physician who treated the most cases — between a hundred and sixty and two hundred — called the first case 'congestive fever' in the burial certificate. I believe his first cases occurred in July. After the official report of the above case of 'degenerated dengue,' he remembered that all his cases were cases of yellow fever. I have received a note from another physician, who had a large number of cases, — between sixty and a hundred, — and he says that he has not seen a case of dengue. Another told me a few evenings ago that he had not seen a case of dengue, although he had treated over sixty cases of fever. I have had no cases in the city; but I have seen a few well-pronounced cases of yellow fever in the practice of other physicians. All that I saw that had albuminuria died. In none was there the pain in the limbs or the eruption. I visited Havana recently, expressly to see yellow fever where there could be no doubt as to its identity. I saw cases in charity, military, and other hospitals; and they were, to all appearances, identical with those I saw here."

We are inclined to favor the view of atmospheric contamination, rather than personal contagion, or fomites, as the medium of conveyance, because persons who had been in Charleston, and who broke out with the disease after reaching distant points, did not seem to communicate it to others. Later in the season, and in localities nearer to the city and more directly on the lines of railroad, the atmosphere, as seems natural, became invaded or tainted by the poison, and many were seized. The disease, in other words, is infectious rather than contagious, in which it exhibits another close relationship to its congener, yellow fever. So far as regards the Atlantic borders, Charleston seems to have been the centre of infection.

We must remember that a pestilence often needs as its starting-point a very limited area; as, in the yellow fever of 1871, one hundred to two hundred yards of territory comprised at one time the entire extent of its jurisdiction, from whence it spread in almost a straight line, and confined within very narrow limits, for a half mile before, by gradual advances, it occupied the entire city.

With regard to the second question, —

"ITS SUPPOSED CAUSATION,"

we reply, that, as far as we can pronounce, no profound or positive explanation can be given. It may be referred to one or two probable sources: First, to general atmospheric causes prevailing or operating at special points only, and confined to the southern sections of the United States, from Louisiana to Florida, Georgia, and South Carolina;[1] though "influenza," we learn, has existed in New York and elsewhere.[2]

A general epidemic constitution of the atmosphere has possibly existed in limited sections with different centres at the South, based, doubtless, on climatic, barometric, atmospheric, and other conditions analogous to those which give rise during other seasons to yellow fever, to influenzas, diseases among cattle, etc. These last vary greatly, also, as regards intensity; the recent influenza in horses (October, 1880) being much less severe than during previous visitations. We say at different centres, because dengue, having prevailed this season at such remote points as New Orleans (date not ascertained) and Charleston, we can hardly suppose that the disease had a common or central origin. However, the epidemic constitution of the atmosphere here must have been favorable to its production and spread this season.

The weather bureau at Washington — Briareus-handed and Argus-eyed, gifted consequently with the power to make wide generalizations from an extensive and intimate knowledge of minute particulars affecting large areas — must tell us in what respect this season differs from or corresponds with those in which yellow fever or dengue were present or absent, and what atmospheric conditions preceded them, whether of unusual heat, drought, or moisture. Or, secondly, if dengue was engendered at one point and spread from that one, and if Charleston was the "*foyer*" of the epidemic for the Atlantic States, we must search in the peculiar condition of the city itself for the special cause, what Professor F. Lieber would have called the "*causa causæ*."

Now, a contamination of the water-supply was supposed to be closely connected with dengue in India, as stated by Capt. Douglas Galton, in a letter published in "The Sanitary Enquirer" of New York (Nov. 1, p. 473). Though we have no positive grounds for supposing that this has been an efficient cause for the production of the disease here, yet great and frequent complaints have been made with regard to the ill condition of the privy vaults. Besides this, the soil has been most extensively turned up and exposed for the construction of a comprehensive system of water-works, with the laying of twenty miles of piping. In the month of May many persons complained

[1] Surgeon J. S. Billings writes (Nov. 24), "The season was an unusually dry one, as you say. With regard to the point in this country at which the disease started, I can say nothing."

[2] Four gentlemen, from widely different sections of this State, suffered from influenza, with fever and pains in the bones, — very like dengue, they thought, — contracted in New York, October, 1880.

of the stench arising from the streets. The work was discontinued during the summer.

Only one of the respondents to Dr. Forrest (Dr. J. S. Buist, a member of the Municipal Board of Health) ascribes the origin of dengue here to the effects of the bad condition of the privy vaults, etc. If this surmise be correct with regard to this city, as well as to the Indies, taken in connection with the extensive soil-upheaval in a locality like Charleston, we may account for the greater contamination of the water-supply this season, and the consequent special origin of dengue, by the fact of the extreme drought lowering the surface of the wells, and permitting greater drainage into them from the vaults, from polluted soil, and other accumulations of filth. We only throw out these as suggestions. Dr. H. F. Campbell of Augusta asserts (paper on "Yellow and Dengue Fever," in report to Board of Health of Georgia, 1876) that great heat and excessive *drought*, and *not moisture*, preceded all the epidemics in Augusta, both of dengue (1850) and of yellow fever (1839 and 1854).

In further confirmation of the plausibility or correctness of such observations, we append a valuable table obtained from the Charleston "News and Courier," which we presume was compiled by the signal-service bureau. It shows the amount of rainfall in inches, by months, from the year 1871 up to the present time: —

Months.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
January	.85	3.78	4.13	3.51	7.77	0.63	4.44	7.83	1.74	2.15
February	3.74	5.13	2.27	10.45	4.27	2.43	2.96	3.15	4.56	3.97
March	4.37	9.78	3.05	3.45	6.37	2.54	7.86	1.94	1.44	2.01
April	4.30	2.46	1.33	2.95	4.56	4.93	15.00	9.08	6.29	3.65
May	3.74	6.30	4.71	5.50	8.51	3.77	2.71	6.32	3.36	0.90
June	3.19	1.87	6.29	2.29	3.15	14.98	10.31	5.47	3.29	2.18
July	.81	2.30	6.97	13.74	1.05	11.26	10.21	12.10	7.77	5.77
August	16.18	7.81	12.94	7.06	1.91	5.10	2.21	10.73	4.50	3.07
September	5.29	7.88	8.18	6.66	4.18	11.26	6.30	8.28	5.90	4.89
October	2.86	3.89	2.07	1.85	3.90	14.32	4.87	3.98	6.74	9.19
November	3.64	3.40	5.08	2.11	3.38	1.35	7.02	3.18	3.70	5.34
December	2.00	2.46	4.94	2.94	1.92	5.85	4.22	5.38	1.00	....
Total	50.97	57.36	61.97	62.51	50.97	78.42	78.11	77.44	50.27	43.12

By this we notice that the rainfall for 1880 — December not included — was 43.12; while other years ranged from 50 to 78, none falling near so low as in 1880. In no seven months of any series of years contained in this table will the rainfall compare for paucity with the seven preceding July last, about which time, or earlier, the dengue made its appearance here and elsewhere.

Whatever, however, be the cause or causes, in the present season has been gendered here or elsewhere at the South an epidemic which has assumed the livery of its twin, but far more fatal, sister, yellow fever.

This leads us to the third and fourth questions: —

"ITS RELATIONS TO YELLOW FEVER, AND ITS DIFFERENTIAL DIAGNOSIS."

If dengue and yellow fever are diseases which are autochthonous, and not introduced, — if we can ascribe their origin to local causes, — then we answer that the atmospheric, or telluric, and special unsanitary conditions this season (assuming that these produce epidemics) were only of a form and intensity sufficient to give rise to a variety of disease with that collection of symptoms and benign characteristics which we are accustomed to designate as dengue, or break-bone. Greater concentration, a different barometrical state, less favorable hygienic conditions as regards heat, dryness, cleanliness, the buried but undestroyed germs of a previous epidemic — had one or all of these existed — might have given rise to a fever of greater malignancy; namely, yellow fever! Who can say?[1]

Happily for us, this disease (dengue), though having some features and characteristics common to yellow fever, is essentially different in the most important particulars. It may be only a mild, hybrid, or bastard form, with more pain, more frequently with sweating and an eruption, but deprived of the specific qualities of yellow fever, being unmarked by intensity, malignancy, or fatality.[2]

To compare the "break-bone" which accompanies yellow fever with the dengue of 1880, we should observe that in the former there was not near so much pain about the limbs, nor was sweating or eruptions nearly so often present. In the "break-bone" intercurrent with yellow fever, we often noted also a depression of the pulse during or after convalescence, not observed in the recent epidemic of "dengue" here.

We know very well that this "break-bone fever," or something very like

[1] It may be well to associate in a note to the above the following facts furnished by Surgeon H. E. Brown, and quoted by Surgeon E. McClellan (in report of Board of Health of State of Georgia, 1876): "Yellow fever began in Charleston in 1699, six years after it was imported into Boston, and ninety-six years before the disease reached New Orleans; not appearing in Augusta, Ga., till 1839, after the opening of the South Carolina Railroad. The trade of Charleston with the West Indies was less active after 1750, from which period to 1792 no outbreak occurred, if we except the year 1762. It was constantly here from 1792 to 1807. But in a period of a hundred and seventy-two years Charleston was infected only forty-one years." In all that time we can scarcely record more than three or four invasions of dengue, so far as we know.

[2] We desire to be brief, but quote from Dr. H. F. Campbell in a "Report on Yellow Fever and Dengue in Augusta" (report of Board of Health of State of Georgia, 1876) what bears directly upon this subject: "Not only do yellow fever and dengue resemble each other in the fact that they are fevers essentially of a single paroxysm, but there are many other characteristics pertaining to each, and common to both, which indissolubly bind them together in a class of which we may say, so far as our knowledge extends, they are the only members. We believe a specific and peculiar morbific agent is the cause of each; but that these poisons, whatever may be their individual characters, very nearly resemble each other in the phenomena they give rise to, there cannot be the slightest doubt. Dengue is by no means 'a mild form of yellow fever;' but, though scarcely ever fatal in itself, it is yet, for grade of fever, for intensity of suffering, and for tardiness of convalescence, by far the more distressing of these two dreadful forms." He is referring to the dengue of 1850.

"dengue," — varying, it is true, at different seasons, — has always accompanied yellow fever. It is a significant fact that we have never been able to distinguish accurately between the two, to say of every case, and at every stage of these two diseases (if they are not a unit), "This is yellow fever," "this only break-bone;" yet the extreme, well-marked examples of undeniable yellow fever were as different in every material respect from the lighter forms of break-bone co-existing with it as black is to white. It was the intermediate cases which puzzled the nosologist, who did not, like the able observer, the late E. Geddings, call them all "yellow fever." The one was a disease characterized, at its inception always, by high temperature, by the supervention of albuminuria, hemorrhages, black vomit, convulsions, bronzing of the skin, fatty degeneration of the liver, and often by death; the other, light, fugitive, often almost ephemeral, only producing some weakness and prostration, and never fatal: and yet they often shaded insensibly into each other, and no distinct lines of demarcation could be drawn by any one. No one could give us a single diagnostic sign. It was a mere question of plus and minus, the decision never being positive or based upon established scientific reasons. The milder cases (modified, doubtless, by partial climatization, by individual differences of bodily health and constitution, by delay, or by methods of management injurious or beneficial in their results) were called break-bone, and the severer yellow fever; yet we were in constant dread lest a case thought to be break-bone should prove to be yellow fever by an aggravation of its symptoms. Those who were what may be vaguely called very sick, who had high fever, or some violent symptoms of several days' duration, who got well by the "skin of their teeth," or who died, enjoyed the uncertain, and, with regard to the latter, the post-humous, credit of having had the real disease.[1]

The dengue of 1828 and of 1850, as they occurred in Charleston (the last seen and suffered from by us), differed in some respects from the recent visitation of 1880. It will not be our province to describe them anew, or point out these differences. It would form an interesting subject for a separate article.

We have just presented a brief and imperfect sketch of the disease as it appeared to us during the past season. To contrast it with true yellow fever, we have only to designate some of the well-known characteristics of the latter, and the query as to the "*Differential Diagnoses*" will be sufficiently answered.

[1] In a paper on "The Pathology and Treatment of Yellow Fever, Epidemics of 1854 and 1858 in Charleston" (Charleston Medical Journal, March, 1859), we used the following language: "We do not pronounce all these yellow fever, giving immunity from second attacks; for we find it impossible to distinguish with precision the grades of fever prevailing where there are those of every shade of intensity, from the simplest to the most severe. We defy any one to decide positively into which category to throw some of those occupying the undeniable middle ground, too severe to be called simple fever, and yet hardly enough so to be classed as yellow fever, and giving immunity from future attacks; and yet the physician has seen apparently milder fevers, at their outset followed by black vomit." Three of the most distinguished physicians in this city attended us whilst sick with fever in 1854: each differed as to the nature and name of the disease. We cannot affirm that we have had yellow fever.

In drawing this contrast we content ourselves with presenting a condensation from the description of yellow fever in an address as president of the South Carolina Medical Association, made before that body, at its meeting in 1872, omitting, however, as foreign to our present object, what we have there and elsewhere said regarding our belief in the great benefits of early treatment, and the curability of the disease when seen and properly managed at its very inception, upon the long-cherished principle "*obsta principiis*."

To make the contrast between the two diseases (dengue of 1880 and yellow fever) more clear, then, let us touch briefly upon a few of the most striking features of the advanced stages of yellow fever, whilst we recall some of the most malignant symptoms developed at that period of the fever when the "blood" being "touched corruptibly," the disease has got completely the mastery, and the patient is smitten, in the impressive language of Scripture, as a "reed is shaken in the waters." Then no picture can be more ominous of evil, more dark and forbidding in its aspect. We do not in the least exaggerate when we cite: The consuming fever, which has burnt up, decomposed, or liquefied the blood, laden also with the effete materials generated by high combustion, and by the retained excretions, which lead to uræmic poisoning, to convulsions, and to coma; the general hue of saffron or of bronze upon the skin, either dry or hot to the touch, or bathed in a clammy moisture; the eyes now watery, dull, and hazy, unenlightened by the clouded intellect, they answer to no message from the brain within; that strangely colored fluid, which the skill of the microscopist or chemist has vainly attempted to distinguish, seems to give relief as it is voided easily through the throat and lips, but with the escape of which life flows almost surely away; the blood oozing from every portal of the body, from mouth and tongue, from uterus and ear and eye, seen for the first time upon the white sheets; the dusky, lurid countenance, marked by its listless, apathetic hebetude; the complete loss, at times, of the faculty of speech; or the wild, maniacal, or muttering delirium,[1] — all and each of which foretell the ending of mortality. In strange contrast to these, the sufferer may be indifferent or insensible to the fate which awaits him, though lying upon the brink of a precipice over which he is soon to plunge irrecoverably into the abyss beyond. His pulse and tongue are absolutely good; his skin, to a superficial examination, is natural to the touch; his mind is clear and tranquil, and he is walking about as if he were a well man; or the placid sleep of infancy may bury his senses in forgetfulness, when the convulsions preceding the death-struggle interrupt this peaceful scene, and put a sudden and violent termination to the hopes and fears of gathering friends.

Yellow, unlike dengue, is a *peculiar* fever, with but one paroxysm, yet with a remission somewhere between the twelfth and seventy-eighth hour, occurring more distinctly when the proper means are used early. The temperature, save at the very beginning, is not extremely high or of very long duration; yet life

[1] "There is, withal, a singular wildness and fierceness of the visage, resembling somewhat that of intoxication, combined with sadness and terror." — S. H. Dickson.

is compromised, we have always believed, by the fever of the first fifteen hours, if it is allowed to go on unchecked.

The peculiar poison, whether introduced or generated here, intensified by atmospheric, telluric, and insanitary conditions, produces nervous paralysis of the capillary arteries, intense fever, excitement of the circulation, with torpor of the glandular and secretory apparatus. It shuts up all the secretions and excretions; and the high fever which it creates, unrelieved by a sweating stage, produces rapid destructive metamorphosis of the tissues, caused by the intense combustion going on during the inceptive stage.[1]

The sum of the existing atmospheric causes, or the poison, from whatever source it may be derived, sometimes, as in the recent epidemic here, suffices to produce only "break-bone." In this the fever, besides being not endowed with the qualities peculiar to yellow fever, — the one neither exempting its subjects from the other, nor *vice versa*,[2] — is never intense enough to produce black vomit, albuminuria,[3] coma, convulsions, or death. It may take off a weak and feeble individual, as the cold breath of March might an old or otherwise diseased person who was ready for the grave. The occasional profuse sweatings in dengue, as in malarial fevers, may modify and diminish the effects of the fever in those cases which manifest a high temperature. By high temperature alone we cannot account for the fatal symptoms of yellow fever, remittent and intermittent often exhibiting quite as much pyrexia. We can only account for the difference, as was surmised, by blindly ascribing it to a special occult poison which is peculiar to the hemagastric pestilence, and which imparts to it all its destructive influences upon the blood, and its consequent malignancy. In a word, we can only *describe* effects, surmise, and attempt to arrest the disease by all the means at our disposal, which, happily for us, we think, are often potent weapons, if handled well and early.

Let us also not omit *preventive* measures. Let us thoroughly drain and cleanse our homes; then let us use hospitality towards the sick and afflicted, and, shutting our doors against none such, we shall quarantine and disinfect ships and cars, keeping them *at a distance* till they are cleansed and purified, together with the clothing, baggage, and effects of their occupants, before either are permitted to enter and pollute a non-infected community.

With regard to the last question, —

"THE RELATIONS OF DENGUE TO MALARIAL FEVERS,"

we reply, That it has no relations or affinity whatever to them, — meaning paludal, or marsh, miasmatic fevers. Though in dengue, or "break-bone,"

[1] Black vomit and albuminuria and coma are due to the altered condition of the blood, which result in what Warren calls "mortified blood." The vomit is blood-thinned by the decomposing action of a peculiar and excessive fever, transuding into the stomach (by diapedesis), and blackened by its acids.

[2] Many persons took dengue who had severe attacks of yellow fever; and those who suffered from dengue in 1850 were seized with yellow fever in 1854 and 1858.

[3] Dr. Forrest cites one example of "break-bone" examined by himself, in which a little albumen was found in the urine.

there may, with more or less frequency, be remissions, relapses, and perhaps intermissions,[1] the occasional profuse sweatings (not preceded by violent or regular chills), the pain, the absence of regularity in the accesses, and of paroxysms, the absence of gastro-hepatic and splenic complications, of glandular enlargements, of the malarial coehexiæ, sufficiently mark its distinction from miasmatic fevers. Quinine we have used, it is true, in the treatment of dengue, but only as a roborant and tonic, — never with a view to its antiperiodic specific properties as a febrifuge medicine; and, according to the Hippocratic maxim, the selection and successful use of a remedy show in what light we regard the disease to which it is applied: *Naturam morborum curationes ostendunt!*

Quinine was used by several persons here to test its powers as a preventive of "break-bone fever;" by a physician of this city (Dr. Ravenel) on himself, — and it failed signally, as it did during the yellow fever of 1854, when employed upon our own person with like intent.

Besides, dengue can exist abundantly where scarcely a trace of malaria is ever found, — certainly where and when no decided malarial fevers co-exist to any appreciable extent, — as in the city of Charleston, Summerville, Aiken, and elsewhere, for example, during the present season. It does not occur also where malaria is in full activity. We wait now (Nov. 20) to see if every trace of dengue disappears with the approaching ice, — that invaluable touchstone for testing yellow fever also. We believe that it has departed wholly with the presence of ice (Nov. 25); and we have also the following from Professor Campbell, under date of Nov. 23, Augusta: —

"The disease has disappeared, I believe, with ice and frosts; though I am conversant with one or two instances of returned absentees who, up to a late date, even since frost, have had genuine symptoms from entering and sleeping in houses that have been closed all summer. This, you know, is familiar in regard to yellow fever."

With regard to the early cases of dengue in Augusta, Dr. Campbell gives us the following particulars: —

"So far as I can ascertain, the first cases were noticed here either very late in August or in the beginning of September: the latter is nearest right. It must have become epidemic *at once*. The first I heard of it was that there were 'many cases.' It was the numerical abundance that attracted attention."

[1] We have noticed these in persons who, having imbibed malaria elsewhere, have subsequently had "break-bone."

REPORTS OF COMMITTEES.

I.

THE REPORT OF THE ADVISORY COUNCIL ON NATIONAL SANITARY LEGISLATION.

Dr. J. S. BILLINGS, *President,*
Chairman ex officio.

Gentlemen of the Association, — As chairman of the Advisory Committee, it is my duty to report briefly the action of that body in regard to measures of sanitary legislation in Congress during the past year.

On the 18th of February a circular letter was addressed to the members of that committee (see Appendix A), calling attention to the legislation relative to public-health matters which had been proposed in Congress up to that date (see Appendix B), and requesting a statement of opinions as to the action which should be taken in behalf of the Association. The replies to this, having been received from the individual members of the committee, were summarized, and the result communicated in the circular letter of March 31, of which a copy is appended (Appendix C). The opinion was nearly unanimous in favor of the bill calling an international congress to consider the means of notification of the existence of contagious or infectious disease at ports under the jurisdiction of the contracting parties. The large majority expressed approval of the bill to increase the efficiency of the National Board of Health, introduced by Senator I. G. Harris; but four of the committee disapproved of the first section, on the ground that it threatened, or made possible, interference with State rights, and with the powers of State boards of health.

A summary of these opinions was communicated to the chairmen of the Committees on Epidemic Diseases of the House and Senate respectively; and a meeting of the Executive and Advisory Committees was called in Washington, D.C., on May 6, 1880, at which meeting, after some discussion, resolutions were passed (see Appendix D), copies of which were duly furnished to the respective congressional committees mentioned. Soon after this there was presented to Congress a memorial from the State Board of Health of Alabama, objecting to the first section of Senator Harris's bill, a copy of which memorial is appended, and marked E. No effort was made by the National Board to urge the passage of any of the bills referred to except that providing for an international conference upon quarantine.

This bill became a law. The invitations to attend have been issued by the department of State to foreign governments for such a conference to meet in Washington in January next, and the invitations have been generally accepted.

Neither of the other bills was brought forward for passage in either house; and, as far as I can learn, it is improbable that they will be proposed again.

When the question of making an appropriation for the National Board of Health came before the House of Representatives, quite a sharp debate ensued. The result was that the appropriation was passed as recommended by the committee, which was a reduction on the estimates made by the Board. This reduction, to judge from the debate, was due to three causes.

The first of these causes was the fear lest the National Board should be a step toward centralization.

The second cause was the fact that the greater part of the funds requested by the National Board of Health were for aid in construction and fitting out of quarantine stations on the South Atlantic and Gulf coasts. This was opposed by some Northern representatives, on the ground that their own cities and seaports were amply able and willing to provide their own quarantine establishments, and that they saw no reason why others should not do the same.

The third cause was a misunderstanding with regard to a technical question as to whether the buildings of the quarantine stations proposed by the Board were to be temporary or permanent, into which question it is unnecessary to enter here.

On the 15th of October, 1880, a circular letter was sent to members of the Executive and Advisory Committees, asking them what action, if any, they desired to recommend to the Association with regard to congressional legislation during the coming winter.

To this circular thirty-four replies have been received, which may be summarized as follows: —

Thirty-two recommend the passage of a resolution by the Association urging Congress to make the necessary appropriations to enable the National Board of Health to continue the work which it has begun, and to enlarge the scope of the special scientific investigations under its direction.

The other two approve this; but think that, in addition, the Association should declare itself in favor of giving more power to the Board over quarantine matters.

So far as I can learn, the National Board itself has no desire for any increase of power so far as quarantine matters are concerned, and, indeed, considers it best to await the recommendations of the International Conference on Quarantine, meeting in January, 1881, before advising any further legislation on this subject.

With the work of the Board during the past year, it is presumed that all are more or less familiar, through its "Bulletin" and supplements, and more especially from its last quarterly report.

The main features of this work in the absence of epidemics are, —

1. The collection of statistical and other information relating to the public health, and the publication of this in its "Bulletin."

2. Investigations made by specially skilled chemists, engineers, and physicians into the causes of disease.

3. The maintenance of ship-hospitals at Ship Island and Sapelo Sound. To these it desires to add at least one similar station on the Texas coast, and one near the mouth of Chesapeake Bay.

4. The maintenance of a system of steam and other boat inspections on the Mississippi River.

5. Aid to certain cities to maintain their quarantine establishments.

For all this the Board has sufficient power, if it is provided with the necessary funds.

In short, a great majority of the Executive and Advisory Committees are of the opinion that it is not desirable that the Association should at this time recommend any change in existing legislation affecting the National Board of Health, but that the Association should use its influence to induce Congress to make suitable appropriations for its work, and to authorize the prompt publication of its reports.

The attention of the Association is invited to two measures of public-health legislation, which are of special interest at the present time, and which merit careful consideration on the part of those interested in such legislation.

The first of these relates to laws for the prevention of the adulteration of food and drugs. The report of the committee of the National Board of Trade appointed to award prizes for the best draught of Acts, State and national, for the prevention of such adulteration, has been recently completed, and will be one of the topics of discussion at the meeting of the National Board of Trade at Washington on the 15th inst.

A copy of this report is appended (Appendix F). As this subject is one which the Advisory Committee has not had sufficient time to consider, to enable them to make any definite recommendation, it is advised that the matter be referred to a special committee, who shall report to the Association at the present meeting as to what action is desirable in the premises.

The second subject is that of the International Quarantine Conference, which is to meet in Washington next month. A copy of the papers relating to this conference, showing the scope of its discussion, is appended (Appendix G). Upon this subject the Advisory Committee has no recommendations to make at present; and it is not considered probable that the action of the conference will be sufficiently advanced before the close of the present session of Congress to permit of any legislation upon the matter in the form of a treaty, or otherwise, being presented during the present winter.

APPENDIX A.

WASHINGTON, D.C., Feb. 18, 1880.

DEAR DOCTOR, — I think it proper at the present time to call your attention to the condition and prospects of sanitary legislation in Congress, and to invite from you an expression of opinion as to what action, if any, should be taken under the circumstances by the representatives of the American Public Health Association.

Your attention is especially invited to the joint resolution for an International Sanitary Conference, and to the bill to increase the efficiency of the National Board of Health, which have been introduced into Congress, copies of which you will find in the National Board of Health "Bulletin" for Feb. 14, 1880, No. 33.

You will observe that this resolution and bill are intended to embody the recommendations made in the annual report of the National Board of Health, and are, I think, in substantial accord with the general sentiment of the Association expressed at the last meeting.

I take it for granted that you have seen the annual report of the National Board, which is contained in supplement No. 2 of the "Bulletin." If you have not, and will advise me, a copy shall be sent you.

There are one or two other bills relating to sanitary matters before Congress, more especially one introduced by Mr. Acklen of Louisiana, relative to inland quarantine, and one relative to the adulteration of food; but it does not seem to me probable that any action will be taken on either of these. They may be printed in succeeding numbers of the "Bulletin."

I shall be glad to have your advice with regard to the bills contained in "Bulletin" No. 33, and as to whether you think it desirable that our Association should take any special action in the matter at this time.

I shall also be glad to have your opinion as to whether it is desirable that I shall in the near future call a meeting of the Executive and Advisory Committees for any purpose. I am inclined to think that at present there is no special necessity sufficient to warrant my calling such a meeting, but that the best time for it will be in connection with the meeting of the American Medical Association at New York on the 1st of June. But I shall be governed as to calling it by the views expressed in reply to this circular letter.

Hoping to hear from you soon, I remain, very respectfully and sincerely yours,

J. S. BILLINGS,
President American Public Health Association.

APPENDIX B.

FORTY-SIXTH CONGRESS — SECOND SESSION.

IN THE HOUSE OF REPRESENTATIVES, Jan. 7, 1880.

Read twice, referred to the Committee on Commerce, and ordered to be printed.

Mr. Acklen, by unanimous consent, introduced the following bill: —

A BILL FOR THE REGULATION OF INTERSTATE FREIGHTS AND PASSENGERS, AND TO RELIEVE THE SAME FROM THE RESTRICTIONS OF LOCAL QUARANTINES.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, whenever any city, town, or place, in any State or Territory, shall have been declared infected with yellow fever, or other contagious or infectious disease, by either the President of the United States or the governor of any State or Territory, on information furnished by the National Board of Health, authority being hereby conferred to make such declaration, or should any State or Territorial board of health, or other competent authority, in the lawful exercise of the police power of the State, make and publish declarations of quarantine, then the Executive Committee of the National Board of Health, and the governor or his appointee, if he chooses to serve, of the State or Territory which shall have made such declarations, or for the State or Territory where said infected city, town, or place may be located, shall be constituted under this Act an executive committee to establish in said State or Territory, at such points as they deem best along the line of the railroads, water-courses, or other lines of travel leading from said infected city, town, or place, quarantine stations, and appoint quarantine officers for the inspection of freights and passengers and those vehicles of transportation whose starting-point or whose destination is beyond the limits of said State or Territory; *provided*, that, should the governor, or his appointee of the State or Territory, decline to serve, then the other persons constituted under this section as the Executive Committee shall proceed at once to carry out its provisions.

SECT. 2. The quarantine officers, appointed under the provisions of section 1 of this Act, shall make their inspection and issue their certificates under such rules and regulations as may be promulgated by the National Board of Health. They shall have the sole and exclusive inspection and certification in the State of all freights and passengers whose starting-point or whose destination is beyond the borders of said State or Territory.

SECT. 3. That when said quarantine officers, under the rules and regulations prescribed by the National Board of Health, shall have duly inspected said freight or passengers, and certified that they are free from infection, it shall be unlawful for any person or persons, whether claiming authority under a State, municipality, board of health, or otherwise, to stop, detain, or in any manner interfere with the passage over said railroads or water-courses or other lines

of travel of said freights or passengers, or their vehicles of transportation, on the charge or ground that they may be infected, or dangerous to the public health.

SECT. 4. The provisions of this Act shall not, however, be construed as applying to freights or passengers whose starting-point and whose destination lie wholly within the limits of the same State or Territory.

SECT. 5. Any person or persons who, contrary to the provisions of this Act, wilfully arrests or detains, or aids or abets in so doing, any freights or passengers, or their vehicles of transportation, on the ground that they may be infected or dangerous to the public health, after the same shall have been certified by the quarantine officers appointed under the provisions of this Act as free from infection, shall be deemed guilty of a misdemeanor, and on conviction thereof shall pay a penalty of one thousand dollars, one-half to be paid to the informer, and shall be punished by imprisonment not less than six nor more than twelve months.

SECT. 6. The expenses incurred under the provisions of this Act shall be paid out of such funds as have been or may be appropriated for the use of the National Board of Health.

FORTY-SIXTH CONGRESS — SECOND SESSION.

IN THE SENATE OF THE UNITED STATES, Feb. 2, 1880.

Mr. Harris asked, and by unanimous consent obtained, leave to bring in the following bill, which was read twice, and referred to the committee to investigate and report the best means of preventing the introduction and spread of epidemic diseases: —

FEB. 24, 1880.

Reported by Mr. Harris with amendments: —

A BILL TO INCREASE THE EFFICIENCY OF THE NATIONAL BOARD OF HEALTH.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the National Board of Health, or, in the interval of its sessions, its Executive Committee, as hereinafter provided, shall report to the President of the United States whenever any place in the United States is considered by it to be dangerously infected with contagious or infectious disease, and that, upon the official publication by the President of such report, the transportation of goods or persons from such place into another State shall be unlawful, and all persons guilty thereof shall be liable to prosecution therefor in the Circuit or District Court of the United States for any district within which such goods or persons shall be transported; and any goods so transported shall be liable to be seized and destroyed, unless such transportation shall be carried on in accordance with rules and regulations made by the National Board of Health, and approved by the President, as in other cases. These rules shall apply until the President shall proclaim such place no longer dangerously infected; and in the meantime the Board, or its Executive Committee, shall report to him weekly, in writing, the sanitary condition of the place in question.

SECT. 2. That the commanding officers of all merchant vessels entering any port of the United States from any foreign port or ports situated between the parallels of thirty degrees south latitude and forty degrees north latitude, or upon the Mediterranean Sea, shall, upon demand therefor, produce and deliver to the customs officer of the port of entry a bill or bills of health for such vessel, signed by the consul, vice-consul, or other consular officer of the United States at such port or ports of departure, or from the medical officer at such port or ports where one has been appointed or detailed for that purpose (such bill or bills to be in accordance with the forms, rules, and regulations prepared for that purpose by the Board, and approved by the President); and in case of non-compliance therewith they shall be liable to the penalties provided for by section 1 of the "Act to prevent the introduction of contagious and infectious diseases into the United States," approved June 2, 1879, that the collectors of customs shall forward monthly to the National Board of Health, through the secretary of the treasury, the bills of health delivered to them during the preceding month by vessels from either foreign or domestic ports, or copies thereof duly certified.

SECT. 3. That whenever, upon an application by the Board for a detail of a medical officer, as provided in section 2 of the "Act to prevent the introduction of contagious and infectious diseases into the United States," approved June 2, 1879, it shall appear to the President that such detail cannot conveniently be made, and such decision shall be communicated by him to such Board, the Board shall be authorized to appoint such medical officer at its discretion; and, if so appointed, his salary shall be paid out of the appropriation under its control.

SECT. 4. That the Board is authorized to confer, from time to time, upon an executive committee consisting of not less than five of its members, such powers and duties as it may deem advisable; but any such extraordinary delegation of powers shall be in force only until the next meeting of the Board, and thereupon shall cease unless renewed.

SECT. 5. That the Board is authorized to print its annual report for the year ending Dec. 31, 1879, with the appended documents, and to have the necessary illustrations prepared for the same, at a cost not to exceed eight thousand dollars.

APPENDIX C.

WASHINGTON, D.C., March 31, 1880.

DEAR SIR, — In response to my circular letter of Feb. 18, a copy of which was sent to you, thirty-one letters have been received. Thirty of these approve of the joint resolution for an international conference with reference to yellow fever, and one is doubtful.

Twenty-eight approve of the "Bill to increase the efficiency of the National Board of Health;" and three disapprove of the first section of it, on the ground that it interferes with State rights, and with the power of State boards of health.

Dr. Plunket of Tennessee suggests that the report called for by section 1 shall not be made without first securing the concurrence of the State Board of Health.

Dr. Hewitt of Minnesota suggests that it (the section) be not stricken out: it shall be so amended as to apply only to yellow fever.

Dr. Webb of Alabama prefers to have the section omitted.

I have called the attention of those having charge of the bill in the House and Senate to these suggestions. The true intent and scope of the section seems to have been much misunderstood. The power which it confers on the National Board is the same power which is now possessed by every State, and almost by every county and town. Its object was not so much to prevent the spread of contagious disease, as to create an independent tribunal, whose decisions as to whether free communication with a given place was dangerous, would be received with respect, and thus to induce local authorities to refrain from establishing local quarantines, or non-intercourse quarantines, and from interfering with commerce.

So far as the National Board is concerned, I am sure that this was its main purpose in advising this section. So far as the section is concerned, it is of very small importance, in a sanitary point of view, as to whether it passes or not; and, as a matter of fact, it is now very probable that it will not pass. Certainly, no member of the National Board is urging its passage.

It is to be feared, however, that those who are trying to create a panic among the politicians with regard to the supposed invasion of States' rights, by the first section of the bill above alluded to, will go further, and attempt to destroy the Board.

This, it is believed, would be directly opposed to the wishes of the American Public Health Association, which, as a body, is desirous of seeing the present National Board sustained, and supplied with the means to carry out the recommendations made by the National Academy of Sciences.

I would, therefore, respectfully advise that you should communicate with your congressional representatives and senators, and advise them of your opinions with regard to the desirability of continuing a national public-health organization, and furnishing it with means to do its work.

With regard to calling a special meeting of the Executive and Advisory Committees, thirty approve the suggestion to call such meeting, in connection with the meeting of the American Medical Association, at New York; and one (Dr. Plunket) suggests that the meeting be in Washington, May 6, in connection with the convention called by the National Board. In obedience to the wish of the majority, a call for a meeting at New York during the first week in June will soon be issued.

I shall be glad to obtain your views on the matters touched on in this letter, and your advice as to the course which should be pursued by the Executive Committee under the circumstances.

Very respectfully,

J. S. Billings,

President Public Health Association.

APPENDIX D.

At a meeting of the Executive and Advisory Committees of the American Public Health Association at Washington, D.C., May 6, 1880, called for the purpose of considering the legislation now pending in Congress in relation to public health, the following action was taken : —

Resolved, That the Executive Committee be instructed to urge upon Congress the importance of passing at the present session the bills for calling an international conference relative to yellow fever, and for increasing the efficiency of the National Board of Health, now pending, and as reported from the special Committee on Epidemic Diseases of the Senate.

Resolved, That the first section of the bill just referred to is considered specially important to the maritime interests of the South Atlantic and Gulf ports of the United States, as tending to secure communication with interior communities with safeguards uniform in their operation, and to relieve such communities from a large part of the expense and annoyance of separate and local action ; and that, therefore, this section should become law.

Resolved, That, while this first section is considered thus important, the remaining sections of the bill are of even greater importance, and should be enacted as law, even if it is necessary to omit the first section to obtain such enactment.

Resolved, That it is highly desirable that Congress should, without further delay, authorize the printing, with the necessary illustrations, of the report of the National Board of Health, with the appended documents and the reports of the yellow-fever commissions in the yellow-fever epidemic of 1878.

Attest : J. S. Billings, *President.*

E. H. Janes, *Secretary.*

APPENDIX E.

The Memorial of the Board of Health of the State of Alabama.

To the Honorable the Senate and House of Representatives of the Congress of the United States of America.

The Board of Health of the State of Alabama having duly considered the scope and tendency of the several bills now pending in the Congress of the United States, "to increase the efficiency of the National Board of Health," have reached, in reference to the same, the following general conclusions : namely, —

1. That it is the duty, as well as the privilege, of every community, as of every individual, to take care of itself to the full extent of its ability to do so, and, amongst other things, to protect itself against the invasion of epidemic diseases.

2. That the practical questions involved in the establishment and manage-

ment of quarantines are of such grave importance, and affect so intimately and so profoundly the material interests of the State and of the local communities within the State, as to make it neither wise nor prudent for us to intrust the administration of quarantine to the hands of any other health authorities than those who are of our own appointment and directly responsible to our own people.

3. That, while the several bills now pending in the National Congress, "to increase the efficiency of the National Board of Health," do not interfere with the right of the State and local authorities to proclaim and enforce such quarantine regulations, in addition to those of the National Board, as to them may seem advisable, they are still open to objection, from the fact that they give to the National Board power to establish and administer quarantines within the limits of the State against all commerce and travel, of which one of the terminal points lies outside of the State; and this without the consent of the local authorities, and even without consultation with them.

4. That it seems to us to be a proposition clearly self-evident to all persons of competent judgment in questions of this kind, that the State cannot afford to allow this large grant of power, so nearly affecting the welfare of our people, to be placed in the hands of the National Board of Health, or of any other agent of the Federal Government, without making earnest efforts to prevent it.

5. That, without entering into the discussion of the principles and circumstances under which it may become advisable for the General Government to extend to State and municipal authorities pecuniary and other assistance towards the establishment and maintenance of quarantines, it still seems perfectly clear to us that the proclamation and administration of quarantines should, in all cases, be reserved to the State and municipal authorities.

6. That it also seems to us to be true beyond all reasonable question, that no uniform system of quarantine regulations, suitable to all times and places, can possibly be devised; but, *per contra*, that the quarantine regulations that are applicable to one place will often prove entirely unsuited to the wants of another place, and that, in different seasons, even the same place will require widely different regulations.

7. That it is the circumstantial details of quarantines that present the practically difficult and important problems of quarantine administration, and that these cannot be wisely ordered nor wisely managed except by experts who are intimately acquainted with local and surrounding conditions.

8. That, these propositions being admitted, it follows that the rule established last year by the National Board of Health, to the effect that assistance should be extended only to such State and municipal boards as had first adopted the national rules and regulations, is very gravely objectionable, both in principle and practice, and ought not to be continued.

9. That the only wise and expedient rule in this regard is this: namely, that such State and municipal boards as desire the assistance of the National Board, should be required to submit their own local regulations to the National Board for examination; and that, if these are found by the National Board to

be of reasonable thoroughness and sufficiency, the needed assistance should then be granted.

10. That the National Board ought properly to have the general direction and control of quarantines against foreign countries, but that even these international quarantines could be most wisely and efficiently administered through the agency of the State and municipal boards having local jurisdiction over our seaport cities.

11. That we are in no sense antagonistic to the National Board, but, contrariwise, appreciate very fully that it has for the exercise of its legitimate functions a wide and important field of usefulness, within which the State and municipal boards have no jurisdiction; and this without emasculating and weakening the State and municipal boards, and without absorbing directly or indirectly their most important functions.

12. That, holding these opinions, we should very much regret to see the power and usefulness of the National Board, in its own proper field of action, diminished or destroyed by the withholding of the appropriations for which it has made application, and which are indubitably necessary for the successful continuance of the scientific investigations, sanitary surveys, and other works of sanitary administration and research which it has auspiciously begun.

All of which is respectfully submitted, in the name and behalf of the Board of Health of the State of Alabama.

Done in the city of Montgomery on the tenth day of May, A.D. 1880.

JEROME COCHRAN, M.D.,
J. B. GASTON, M.D.,
S. D. SEELYE, M.D.,
J. S. WEATHERLY, M.D.,
M. H. JORDAN, M.D.,
GEO. A. KETCHUM, M.D.,
C. D. PARKE, M.D.,
P. BRYCE, M.D.,
J. J. DEMENT, M.D.,
GEO. E. KRUMPE, M.D.,
Committee of Public Health.

APPENDIX F.

REPORT OF COMMITTEE OF AWARD.

NEW YORK, Oct. 27, 1880

FREDERIC FRALEY, Esq.,

President National Board of Trade.

SIR, — The committee appointed by the National Board of Trade for the purpose of awarding prizes for the best Act or Acts, accompanied by an essay, designed to prevent injurious adulteration, and to regulate the sale of food

without imposing unnecessary burdens upon commerce, have the honor to report as follows : —

In accordance with the resolutions under which the committee was constituted, we have carefully examined the papers submitted in this competition, and from these have selected as the three most meritorious essays, with the accompanying Acts, numbering them consecutively in the order of merit as follows : —

No. 1. The essay and Acts having the motto, "*Aequo Animo.*"

No. 2. The essay and Acts having the motto, "*Sic utere tuo ut alienum non lædas.*"

No. 3. The essay and Acts having the motto, "Overcome Evil with Good."

Upon opening the sealed envelopes, having corresponding mottoes, it is found that the authors of these essays are as follows : viz., —

No. 1. Motto, "*Aequo Animo,*" G. W. Wigner, F.C.S., London.

No. 2. Motto, "*Sic utere tuo ut alienum non lædas,*" Vernon M. Davis, New York City, N.Y.

No. 3. Motto, "Overcome Evil with Good," William H. Newell, M.D., Jersey City Heights, New Jersey.

In addition to these essays, we recommend the printing of the essay having the motto, "Cardinal Cajetan," whose author is O. W. Wight, M.D., Health Officer, Milwaukee, Wis. ; and the remarks submitted under the motto, "Work and Wait," by Albert B. Prescott, Ann Arbor, Mich.

In connection with this award, the following remarks are respectfully submitted : —

1. In view of the statements which for the last two or three years have from time to time been made with regard to the prevalence in this country of adulterations of food which are dangerous to health and life, and which have created so much agitation in the public mind as to induce the National Board of Trade to establish this competition, it is very gratifying to find that none of the essayists produce any definite or satisfactory evidence as to the wide-spread existence of such dangerous adulterations in this country.

The absence of such evidence, in addition to the results recently obtained by several expert chemists in extensive series of analyses of the usual articles of food in this country, — which results have been made known to the committee, — fully warrants us in declaring that none of our staple articles of food or drink are so commonly adulterated as to be dangerous to health or life. Such dangerous adulterations appear to be mainly in the form of poisonous colors or coloring matters, as, for instance, in confectionery ; and even these are rare.

2. The question of the adulteration of food, with perhaps the exception of milk, should therefore be considered, not so much from a sanitary stand-point as from that of commercial interests ; as being of the nature of a fraud, in aiding the sale of articles which are not what they are represented to be. The main objects of legislation upon this subject should be to prevent deception, to furnish to the public authoritative information, and to nullify the operations of ignorant and sensational alarmists, who damage the business interests of the country quite as much as do the evils of which they complain.

3. We are of the opinion that there is much more danger to health and life in this country from adulterated drugs than there is from adulterated food, and that any legislation which is to deal with the one should also deal with the other.

4. To indicate the legislation upon the adulteration of food and drugs, which will protect health and prevent fraud and at the same time not impose unnecessary burdens upon trade, is a matter of very great difficulty, as the result of this competition clearly shows; for we do not consider any of the Acts proposed to be satisfactory. In this matter it is much better at first to do too little than too much, and the first steps in such legislation should be tentative and educational in character.

5. While it is highly desirable that the general principles of legislation on this subject should be the same in all States, we do not think it possible to secure by State laws absolute uniformity in the details in all parts of this country; and it would therefore be unwise to make the attempt.

6. We do not think that any law upon the adulteration of food and drugs can be made efficient without a properly constituted health authority to supervise its execution. The questions involved are in a high degree technical, and require special training in those charged with administering the law. At the same time we think that the existence of such health authorities should be taken for granted in the Acts, and that these should not attempt to create them.

We believe that every State should have a board of health, but that such boards should be created by independent legislation.

7. We think it unadvisable that the law should attempt to define in detail as to what an adulteration is. A very considerable amount of discretion should be left to the board of health in this respect, limiting it only in the direction of possible over-rigidity. Many well-recognized articles of commerce, although harmless and even useful, may be said to be adulterated; and it should be left to the discretion of the board to exempt any article from the penalties imposed in the Act.

8. Care should be taken not to make the penalties excessive. It should be remembered that mere exposure of fraudulent practices, if effectually and persistently made, is in itself a penalty; and, as a rule, public opinion may be trusted to make such practices unprofitable, if measures be taken to make this opinion a correct one, which we think should be the great object of the law proposed.

Under no circumstances should fees or moieties to informers be allowed.

9. We think that both State and national laws upon this subject are desirable. The State law should deal with the subject in the individual State. The national law should deal with adulterated articles coming from foreign countries, or passing from one State into another, and also with adulterations in the Territories, the District of Columbia, and in all places under the special jurisdiction of the United States. It is, of course, in the highest degree desirable that the State and United States legislation on this subject should not be discordant.

The educational feature should be even more prominent in the national than in the State law; while the punitive feature should, if any thing, be less severe. As the State laws will vary somewhat in this last respect, it follows that the penalties in the United States law should be at a minimum.

10. The committee will endeavor to prepare, and to place in the hands of the president of the National Board of Trade, as soon as possible, draughts of Acts prepared in accordance with the general principles contained in this report.

All of which is respectfully submitted.

(Signed) JOHN S. BILLINGS,
C. WILLIAMSON,
C. F. CHANDLER,
A. H. HARDY,
Committee of Award.

APPENDIX G.

No. —.

DEPARTMENT OF STATE, WASHINGTON, July 30, 1880.

SIR, — I have to state for your information, that, in pursuance of a joint resolution of Congress, which was approved on the 14th of May last, the President has determined to call an International Sanitary Conference to meet at Washington, and to invite to join in the proposed conference the several powers having jurisdiction of ports likely to be infected with yellow fever or cholera, with a view of securing the adoption by the powers in question of an international system of notification as to the actual sanitary condition of ports and places under the jurisdiction of such powers, and of vessels sailing therefrom.

I enclose herewith a memorandum in which the circumstances which have induced this government to ask those of other nations to join in the proposed International Sanitary Conference are set forth, and which concludes with a statement of the specific propositions which the President would desire to submit to the conference.

In view of the urgent necessity which, according to the experience of this government, exists for prompt action in reference to this matter, I have to instruct you to lose no time in calling the attention of the government of ——— to this subject by transmitting for its information a copy of the memorandum above mentioned, and by asking it at the same time to take into consideration the expediency of holding a conference of the character proposed, and requesting it to communicate its views on the subject to this government at as early a date as may be convenient.

You may add that it is thought by the President that such delegates as may be appointed by the several powers to attend the proposed conference should be authorized to conclude, if deemed expedient upon consultation, an international convention, in relation to any proper subjects for international sanitary regulations to be proposed for the consideration of the governments interested.

In order that the proposed conference, if agreed to by the several foreign governments interested in the subject, may be held at as early a period as practicable, the President deems it expedient to suggest the first day of January, 1881, as a suitable date for the assembling of the conference in the city of Washington. In the event, however, that the government of ——— should have occasion to prefer a different date for the meeting of the conference, this government will be ready to reconsider the question with a view to an alteration in the date.

I am, sir,

Your obedient servant,

WM. M. EVARTS.

MEMORANDUM IN RELATION TO POINTS PROPOSED TO BE SUBMITTED TO AN INTERNATIONAL SANITARY CONFERENCE.

DEPARTMENT OF STATE, WASHINGTON, July 29, 1880.

A joint resolution of the Senate and House of Representatives of the United States, approved May 14, 1880, authorized the President "to call an International Sanitary Conference to meet at Washington, D.C., to which the several powers having jurisdiction of ports likely to be infected with yellow fever or cholera shall be invited to send delegates, properly authorized, for the purpose of securing an international system of notification as to the actual sanitary condition of ports and places under the jurisdiction of such powers, and of vessels sailing therefrom."

This resolution has its origin in the practical difficulties which have been encountered in the administration of the regulations and rules recommended by sanitary experience and framed by the legislation of the country to the end of preventing the introduction and spread of yellow fever, cholera, and other contagious or infectious diseases in the territory of the United States. The extensive prevalence of yellow fever in certain parts of this country during the past two years, and the almost continual existence of the danger of the introduction of such contagious or infectious diseases as yellow fever and cholera, by vessels coming to this country from infected ports abroad, gave rise to such legislative measures; but the difficulty in their application has been chiefly owing to the fact that in certain foreign ports where infectious or contagious diseases have existed, or were supposed to exist, the local authorities have shown some hesitation as to co-operating with the consular and medical officers of the United States in carrying out regulations deemed essential by this government as a sanitary safeguard.

Moreover, in consequence of the vague and untrustworthy evidence obtainable in some cases as to the sanitary condition of suspected foreign ports, vessels coming thence to the United States have, in some instances, as it has afterwards appeared, been subjected to unnecessary quarantine in the ports of this country. On the other hand, vessels from non-infected ports of the United States have been compelled to submit to like unnecessary and vexatious delays by the quarantine regulations of other countries, based upon imperfect knowledge of the sanitary condition of American ports.

The joint resolution of Congress, quoted above, contemplates only securing "an international system of notification as to the actual sanitary condition of ports and places," and does not touch on the broader and more intricate question of the preventive sanitary measures imposed in the ports of each country, in conformity with its own laws and in proportion to the danger of outward communication and internal spread of epidemic disease at the port of introduction. The government of the United States, recognizing the essentially local character of quarantine requirements, and their adaptability to the sanitary conditions and risks in the districts where they are applied, would not seek to propose any international code of general quarantine laws, even did the system of State and Federal governments in the United States favor bringing the sanitary precautions of the seaboard States from Texas to Maine, with all their varying conditions, under one governmental code.

But the President is of the opinion that the great inconveniences and losses which the commerce of the world has been, and is now, suffering from the delays and obstructions caused by unnecessary quarantines, can, to a great extent, be relieved by the establishment, as contemplated by the congressional joint resolution of May 14, 1880, of an international system of notification as to the actual sanitary condition of ports and places likely to be infected with communicable or epidemic diseases.

And, following the authorization of the resolution referred to, he has, therefore, deemed it proper to submit to the governments of the chief maritime powers the expediency of holding a conference at an early day, in this city, to consider the subject of a proper and applicable scheme of such international notification.

The specific propositions which the President would desire to submit to the proposed conference would include the following: —

A. The establishment of a reliable and satisfactory international system of notification as to the existence of contagious and infectious diseases, more especially cholera and yellow fever.

B. The establishment of a uniform and satisfactory system of bills of health, the statements in which shall be trustworthy as to the sanitary condition of the port of departure, and as to the condition of the vessel at the time of sailing.

The discussion of these points would involve, among others, the following questions: —

I.

Who should be the certifying officer or authority as to the sanitary condition of ports and places, and of vessels?

II.

How can the certifying authority obtain trustworthy information as to the actual sanitary condition of ports and places, and as to the presence of contagious and infectious diseases?

III.

When yellow fever or cholera exists at or in the vicinity of a port or place, what examination should be made of a vessel sailing therefrom to secure a trustworthy knowledge of her sanitary condition?

IV.

To what extent, and under what conditions, should a clean bill of health be considered as affording satisfactory evidence that the vessel is free from danger of conveying infectious disease?

V.

In what way can trustworthy information be obtained from ports or places in countries which have imperfect or unsafe quarantine and sanitary regulations, and which may be unwilling or unable to adhere to the proposed international system?

VI.

Whether a schedule of graduated penalties could be fixed, to be exacted from vessels for various offences arising under the proposed international system?

II.

REPORT OF THE COMMITTEE ON THE PREVENTION OF VENEREAL DISEASES.

By ALBERT L. GIHON, M.D.,
Medical Director U. S. N., Chairman.

Your Committee, to whom was assigned the duty of suggesting some practicable plan for the prevention of the spread of venereal diseases, with especial reference to the protection of the innocent and helpless members of the community, beg to report: —

That they have endeavored to consider the question without bias or prejudice, uninfluenced on the one hand by the misrepresentations of certain pseudo-moralists, who have uncharitably denounced in advance their assumed intention to recommend the governmental license of prostitution; and on the other, by appeals from no less earnest, honest, and righteous persons, who, with equal insistence, have urged the propriety and necessity of just such action.

Manifestly the first essential to the successful establishment and operation of any system of repression or prevention is the recognition by the community of the magnitude of the danger it is incurring without it. Diphtheria and typhoid continued to commit their ravages with a sad submission to what was supposed to be the will of an inscrutable Providence, until the public learned that their homes were desolated through their own culpable carelessness. To-day syphilis lurks in the most exemplary household, defiles the parent and blights the offspring, its very name being unknown to them. Until the public are taught that mere personal rectitude is no safeguard, it is idle to expect that any system will be cordially indorsed. So long as venereal disease is popularly believed to be only the fruit of illicit sexual congress, its very consideration will be shunned. The public must, therefore, be enlightened — and your Committee beg to remind this Association that this task is eminently its duty — as to the existence in their midst of a disease, which is fraught with as much evil to humanity as any of the ills which afflict the human body. The other great scourges of mankind are occasional, like cholera, or limited by climatic bounds, like yellow fever, or outwardly hideous and terrifying, like small-pox; but syphilis spreads its venom invisibly, insidiously, daily throughout all seasons, in every land, and among all races and conditions of people.

Certain individuals, few of them physicians, have disputed the statement that syphilis is either very common, or so dangerous that it is beyond speedy and permanent cure. In the absence of exact numerical statistics, your Committee believe it will be sufficient to refer to the experience of those medical practitioners who have had opportunities of judging, confident that they will, without exception, declare with Parent Duchatelet, that, "of all contagious diseases to which the human species is liable, and which cause the greatest evils to society, there are none more serious, more dangerous, or so much to be dreaded, as syphilis, its ravages far surpassing those of all the plagues which at different times have terrified society;"

With Professor Gross and Dr. Marion Sims, that "a greater scourge than yellow fever and cholera and small-pox combined is quietly installed in our midst, sapping the foundations of society, poisoning the sources of life, rendering existence miserable, and deteriorating the whole human family;"

With Sir Thomas Watson, that "it counts its victims, not only in the ranks of the vicious and self-indulgent, but among virtuous women and innocent children by hundreds and thousands;"

With Sir James Paget, that "it would be difficult to overstate the amount of damage that syphilis does to the population, children being born with diseases induced by it, which render them quite unfit for the work of life;"

With the other eminent medical men, quoted by Dr. Sims in his inaugural address as President of the American Medical Association at Philadelphia in 1876, — Sir William Jenner, Prescott Hewitt, and Mr. Simon, Chief Medical Officer of the Privy Council, — who have borne testimony of their experience of "its ravages among pure women and spotless children."

Statements such as these do not need to be backed by numerical data of questionable value. These can often be distorted to prove any point desired, by selecting for comparison maxima and minima years, or special returns from certain localities, as illustrated by the array of figures by which the opponents of the British Contagious Diseases Acts have sought to prove that the sanitary surveillance of public women has actually augmented the amount of venereal disease in countries where it is exacted.

The following extract from the *Statistical Report of the Health of the Navy for the year 1879*, presented by the Director-General of the Medical Department, John W. Reid, M.D., and ordered 24th August, 1880, by the House of Commons, to be printed, is a sufficient refutation of this misstatement: —

Ratio of Syphilis in the Navy of Great Britain from 1860 to 1879 inclusive, at Ports under the Contagious Diseases Acts, contrasted with that at Ports not under the Acts.

PERIOD.	Ratio of Cases per 1,000 of Force.					
	At Ports under the Acts.			At Ports not under the Acts.		
	Primary.	Secondary.	Total.	Primary.	Secondary.	Total.
No Acts in force — 1860–63 . . .	....	....	75.02	....	....	70.05
Act of 1864 in force — 1864-65 . .	....	....	79.12	....	....	100.
Acts of '66 and '69 in force — 1866–70,	34.72	12.47	47.19	59.14	25.6	84.74
" " " — 1871–79,	28.79	11.10	39 89	72.27	21.8	94.08

At best but a small proportion of venereal diseases ever appears on vital returns. The true statistics of their frequency are the professional secrets of the physician, whose aid is sought to relieve them, or whose eye recognizes them beneath the mask of other ailments. The most carefully prepared reports fail to exhibit the rheumatisms, the cachexiæ, the cutaneous affections, the defects of vision, the lesions of the spinal cord, the brain, the liver, which have had syphilis for their cause. Especially is this true of transmitted syphilis. Only a few days ago, a distinguished American ophthalmologist declared to one of your Committee, that the majority of his infant patients were characterized by the oldish features and notched incisors and badly shaped head which mark the syphilitic child; and he boldly asserted that interstitial keratitis was always a consequence of constitutional contamination. The greater proportion of venereal cases stalk about the streets in affected health, and never appear on any returns. How many others find expression in suicide, in insanity, in conjugal infidelity, and in actions for divorce!

As far as mere figures can be evidence, the statistics carefully collated by Dr. Frederic R. Sturgis of New York are worthy of consideration. A summary of the poor treated in 1873 at the various hospitals and dispensaries of the city of New York, enabled him to estimate the total number of venereal and syphilitic poor patients; but this did not include those treated at their homes, often by themselves, at physicians' offices, by apothecaries, and by quacks. Notwithstanding these omissions, of 280,536 poor persons receiving aid at public institutions, 12,341 suffered from venereal diseases, 5,045 of these being syphilis; that is, forty-four in every thousand cases were venereal, eighteen per thousand being syphilitic.

In Mr. Wagstaff's report of the amount and kind of venereal disease under treatment at certain charitable institutions in London during the year 1868, it is stated that sixty-nine in every thousand patients were venereal, thirty-five of these being syphilitic; and he estimates, that, among the million and a half

of poor population of the metropolis, who receive medical relief for disease at hospitals, dispensaries, and at the hands of parochial medical officers, about one in fourteen is affected with venereal disease of some kind, — this not including midwifery cases, nor the classes excluded in Dr. Sturgis's report.

During the same year, 9,796 venereal patients were treated at the hospitals in Paris; and M. Lecour, Préfet of Police, estimating these as one-fifth of the total number of venereal patients treated at their homes by physicians, or who seek relief at the hands of apothecaries and charlatans, gives a sum total of 48,980 cases, about one in forty of the entire population. "A formidable array, and one probably much below the real amount."

The same estimate of the proportion of private to public cases of five to one, arrived at by Dr. Sturgis from wholly different data, would give for New York, out of a much smaller population, 61,705 venereal patients, or nearly one in every fifteen of its men, women, and children, — a number only dwarfed by comparison with London, where one hundred thousand poor alone are annually affected with syphilis.

Military and naval reports, while not free from the same objections of defective registration and classification, are, however, very much more exact, especially in the matter of enthetic diseases, there being less reluctance to apply for treatment, and less dread of exposure on the part of the patient in a community composed wholly of men, and no alternative but to consult the medical officer, who is required to include them in his reports. Your Committee are indebted to the Surgeons-General of the Navy, Army, and Marine Hospital Service, for the following official returns of the amount of venereal disease treated by medical officers in the naval and military services and mercantile marine of the United States during the last five years.

VENEREAL DISEASE IN THE UNITED STATES NAVY.

Year.	Total Force Afloat.	Total Sick from all Causes on board Men-of-War.	No. of Cases of Venereal Disease.	No. of Cases of Syphilis.	Per 1,000 of Force.		Per 1,000 of Sick.		Per Cent of Syphilis to Venereal.
					Venereal.	Syphilis.	Venereal.	Syphilis.	
1873 . . .	12,723	8,837	1,029	595	81	46	116	67	57.82
1874 . . .	13,870	9,995	963	562	69	40	96	56	58.36
1875 . . .	10,141	7,832	956	500	94	49	122	64	52.30
1876 . . .	11,138	7,797	889	437	79	39	114	56	49.15
1877 . . .	7,461	6,748	703	342	94	45	104	51	48.65
1878 . . .	7,806	6,873	751	341	96	54	109	50	45.40
1879 . . .	8,869	10,488	1,101	490	124	45	105	47	44.50
Average . .	10,287	8,367	913	467	88	45	109	56	51.15

VENEREAL DISEASE IN UNITED STATES ARMY.

Years.	Total Force.		Total Sick from all Causes.	No. of Cases of Venereal Disease.	No. of Cases of Syphilis.	Per 1,000 of Force.		Per 1,000 of Sick.		Per Cent of Syphilis to Venereal.
						Venereal.	Syphilis.	Venereal.	Syphilis.	
1875–76,	White .	21,718	32,523	2,262	1,147	104	53	69	35	50.70
	Colored,	2,014	2,971	364	198	181	98	126	67	54.40
	Total .	23,732	35,494	2,626	1,345	110	57	74	38	51.22
1876–77,	White .	23,383	34,683	2,463	1,283	105	55	71	37	52.09
	Colored,	2,083	3,779	351	170	169	82	93	45	48.43
	Total .	25,466	38,462	2,814	1,453	110	57	73	38	51.64
1877–78,	White .	20,812	26,398	1,840	954	88	46	69	36	51.84
	Colored,	1,895	3,048	321	146	169	77	105	48	45.84
	Total .	22,707	29,446	2,161	1,100	95	48	73	37	50.90
1878–79,	White .	21,847	32,814	1,902	885	87	41	58	27	46.53
	Colored,	1,964	3,455	281	155	143	79	81	45	55.15
	Total .	23,811	36,269	2,183	1,040	92	44	60	29	47.64
1879–80,	White .	22,087	33,645	1,957	960	89	43	58	29	49.05
	Colored,	2,387	3,669	309	152	129	64	84	41	49.09
	Total .	24,474	37,314	2,266	1,112	92	45	60	29	49.08
Mean .	White .	21,969	32,013	2,085	1,046	95	48	65	33	50.17
	Colored,	2,069	3,384	325	164	157	79	96	48	50.
	Total .	24,038	35,397	2,410	1,210	103	50	68	34	50.

VENEREAL DISEASE IN MERCANTILE MARINE.

(As shown by United States Marine Hospital Service Reports.)

Years.	Total Sick from all Causes.	No. of Cases of Venereal Disease.	No. of Cases of Syphilis.	Per 1,000 of Sick.		Per Cent of Syphilis to Venereal.
				Venereal.	Syphilis.	
1875–76. . .	10,975	2,698	2,110	246	192	78.20
1876–77. . .	10,914	2,061	1,627	189	149	78.94
1877–78. . .	11,334	2,162	1,825	190	161	84.41
1878–79. . .	11,449	2,362	1,818	206	159	76.93
1879–80. . .	24,860	6,384	4,492	257	180	70.36
Mean . . .	13,906	3,133	2,374	225	171	75.71

The table of Venereal Disease in the United States Navy, presented on p. 8, comprises not only those classed as enthetic diseases, but also the large number of venereal affections reported by medical officers under the class of local diseases affecting the urino-genital system. No such distinction having been made in the tables furnished by the Army and Marine Hospital Service, those local lesions have been here included, the propriety of this being evident from the following exhibit of them in detail: —

Year.	Enthetic Diseases.			Diseases of Urino-Genital System.						Total Venereal Diseases.
	Syphilis.	Gonorrhœa, etc.	Total.	Cystitis and Prostatitis.	Dysuria and Hæmaturia.	Epididymitis and Orchitis.	Paraphimosis and Phymosis.	Urethræ Stricture and Vesicæ Fistula.	Total.	
1873 . .	595	228	823	18	8	123	11	46	206	1,029
1874 . .	562	157	719	16	12	159	16	41	244	963
1875 . .	500	237	737	14	10	147	13	35	219	956
1876 . .	437	267	699	13	9	118	10	40	190	889
1877 . .	342	185	527	12	10	120	7	27	176	703
1878 . .	341	208	549	22	7	125	13	35	202	751
1879 . .	490	363	853	24	3	150	18	53	248	1,101

The special character of the disease is, however, of minor interest to non-professional men, who, if indifferent to the moral and sanitary considerations involved, cannot avoid looking at the practical aspect of the question, and paying heed to the facts, that the effective force of a navy of ten thousand men is actually diminished nearly one thousand by men on the sick-list with preventable diseases of their genital organs, and that one-ninth of the sums appropriated for the care and treatment of the sick is expended upon a class of vile disorders which ought not to exist.

The last year of the Marine Hospital Service reports includes patients treated at the dispensaries and surgeons' offices outside of hospitals. Neither these nor the naval and military returns include the large number of cases not registered, and treated surreptitiously by apothecaries, nurses, and hospital-stewards. Officers generally avoid the necessary exposure; and their cases, consequently, seldom appear on the returns. Enough has been shown to establish this fact, that at least one man in every thirteen in the naval service of the United States (last year, one in ten), one in every nine in the army, of the negro troops one in six, one in every seven in the British army, and one in every four of the merchant sailors, presenting themselves for treatment at marine hospitals and dispensaries, are affected with some form of venereal disease.

The amount of venereal disease in the British navy is no less formidable. The tables following, extracted from the last report of the Director-General, show that, during the past ten years, among every thousand men in the service, there has been a daily average of forty-five or forty-six unfit for duty by reason of sickness; and that, of these, ten or eleven — about one-fourth of all the sick — were disabled by this class of diseases.

VENEREAL DISEASE IN THE BRITISH NAVY.

Year.	Average Force.	Total Sick from all Causes.	No. of Cases of Venereal Disease.	No. of Cases of Syphilis.	Per 1,000 of Force.		
					All Causes.	Venereal.	Syphilis.
1879 . .	44,745	49,976	6,274	2,585	1,116.90	140.19	57.76
1869–78	....	....	....	....	1,188.76	126.56	55.75

Year.	Average Number of Men Sick Daily.					Ratio per 1,000 of Daily Sick.				
	Sick from all Causes.	Total Venereal and Genito-Urinary Disease.	Syphilis.	Gonorrhœa.	Other Diseases.	Sick from all Causes.	Total Venereal and Genito-Urinary Diseases.	Syphilis.	Gonorrhœa.	Other Diseases.
1879 . .	2,012.8	492.57	250.47	211.77	30.33	44.98	10.99	5.59	4.73	.67
1869–78 .	....	....	....	....	....	46.52	10.	5.62	4.38	....

Your Committee are able, by the courtesy of the Surgeon-General of the Navy, to supplement these alarming figures by the significant fact, that, of the boys who were applicants for enlistment as apprentices in the United States Navy during the year 1879, twenty per thousand — one in every fifty lads under seventeen years of age — were rejected on account of venereal disease, twelve of these being syphilitics. Furthermore, of the young men examined at a certain institution, which they had left two years before in good health, not one in five escaped venereal disease of some sort. There is no reason to believe that the proportion among other young men is less appalling. The family physician, and the specialist for private diseases, advertised without disguise in the family newspaper, will never tell the tale of the tens of thousands who seek relief at their hands.

But, even were it possible to obtain accurate information of the number of cases of venereal disease contracted *in coitu*, it would give no indication of the actual injury to the human race by these diseases. It would take no account of the myriads of the happily stillborn and of the feeble offspring, who bring their taint into the world with them, after having diseased their mothers during their intra-uterine existence; nor of those other myriads contaminated by mere contact with the infected, who mingle in every crowd. Every one instinctively shrinks from the touch of the sufferer with small-pox; but how few realize that the syphilitic is a leper, also to be shunned! how few mothers are aware of the danger to themselves and their children from nurses and housemaids, drawn from a population in which every fifteenth person is diseased! how few parents suspect the peril to their daughter from her accepted lover's kiss, who may be that one in every five young men among the better classes, who has a venereal disease, which, there is one chance in two, is syphilis!

These are not speculations. Gross has seen many cases communicated by kissing; and he tells of fifteen women, nine children, and ten men diseased by a midwife, who had a chancre on her finger, contracted in the exercise of her profession, and who had thus carried the disease from house to house.

Marion Sims says, "I have seen a cook and chambermaid with syphilitic ulcers on the fingers, and nurses, infected by the children who had been born of syphilitic parents, in turn infecting sucking babes, born of healthy parents; and I have known a drunken vagabond husband to contract syphilis in a low brothel, and communicate it to his wife, who unwittingly gave it to her four children simply by using the same towels and washbowl;" and one of your Committee can add the case of an estimable and venerable lady who lost her eyesight this very year, from using a towel in her son's room, carelessly left by him upon the rack; and another, of the wife of a clergyman, who, this summer, sought relief at a Virginia spring for a horrible affection contracted in domestic contact with her servant.

The present Surgeon-General of the Navy, Dr. Wales, saw a number of cases of chancre of the lips among the smokers of one set of cheroots, of which the wrappers had been moistened by the saliva of a Manila cigar-girl; and, at Beyrout, he learned that it was not unusual for syphilis to be contracted by using an *arghileh* that had been pressed by the lips of a diseased smoker. Who would venture to eat the Smyrna fig, if he had seen the top layer of the choicest box pressed flat by the saliva-wetted thumb of a packer, who, there was one chance in ten, was a syphilitic?

A member of your Committee astounded an otherwise well-informed gentleman by explaining the risk he ran, after he had been capsized in a river, in accepting the proffer of a flannel undershirt from a young man, whose body was accidentally discovered to be spotted with a suspicious eruption.

A lady was equally alarmed when told by her husband, a physician, that she had invited to her table a young man, who, in the course of a physical examination that morning, had been found to have his mouth and tongue covered with mucous patches; and that her daughter was dancing in a public ball-room with another whose body was repulsive from syphilitic ekzema.

A tried invalid at a fashionable hotel had just settled himself in bed, when the odor of tobacco on the pillow prompted an inspection, which revealed sheets that had not been changed, and which, being a medical man, he quickly deserted, conscious that they might have shrouded a syphilitic predecessor.

An editorial in "The College and Clinical Record" of Philadelphia of October 15, states, "It happened to the writer to be recently called to see a man of most respectable surroundings, who bore an unmistakable venereal sore upon his lip, and subsequently manifested all the features of secondary syphilis. It was said that this had followed a trifling surgical operation upon the part affected for the removal of a slight deformity; the instruments or hands of the surgeon communicating the specific virus, in the same manner, it will be remembered, that a New York dentist, not long ago, communicated syphilis by his forceps, and a well-known laryngologist inoculated a number of patients with pharyngeal chancre."

When the public know by how many thousand channels this disease may assail them, your Committee have no doubt that they will demand protection at any cost; and they urge upon this Association the promulgation of the fact, that, so long as syphilitics are allowed to go unrestrained, the spotless woman and the innocent child share the danger of contamination with the libertine and prostitute. Let it be known that this fearful pest may be communicated, —

By the blankets of the sleeping-car, the sheets, towels, and napkins of the steamship, hotel, and restaurant;

By the hired bathing-dresses at the seaside resort, and the costumes rented for the fancy ball;

By the chipped edges of a coffee-cup, as seen at any hotel or eating-house, and their half-cleansed knives, forks, and spoons;

By the public drinking-vessel in the railway car or station, as well as the public urinal or closet;

By the barber's utensils, the comb and brush in the guest-chamber, the hatter's measure, or the borrowed hat;

By the surgeon's and dentist's instruments, or the vaccinator's lancet;

By the broom or dustbrush handled by a parlor-maid, or by the spoon touched by the mouth of the cook or nurse;

By the toys sold to children in the streets by vendors with poisoned lips or fingers;

By playing and visiting cards, which have been used, and especially by car-tickets and paper money circulating in a city where fifty thousand syphilitics are at large;

By the loaned pipe or cane or glove;

By the grasp of a friend's hand, or the kiss of a betrothed lover; by the son to his mother and sister, the husband to his wife and unborn child, and by the latter to its mother.

Were venereal disease restricted to those who seek illicit sexual gratification, it might be well to let the guilty suffer and die; but, when their sin is sure to leave upon them an ineradicable taint, and to be transmitted to their helpless offspring; when, worse than all, the syphilitic leaves his stain upon whatever he touches, to foul the chance passer, man, woman, or child, as fearfully as if they had visited the vilest lupanar, it becomes the duty of this Association — the most important of all its duties — to devise some plan for their protection.

Your Committee have been charged with the suggestion of such a practicable plan. Of the numerous propositions submitted to them, that most zealously advocated provides for the registration and compulsory examination of prostitutes, and the seclusion of those diseased; but this alone your Committee does not hesitate to admit to be inadequate.

It has undeniably accomplished a wonderful amount of good in continental cities, in the military towns of England, in insular garrisons like Malta, and recently and remarkably in Japan. On this point the universal testimony of naval and military officers cannot be impeached. Fournier, one of the ablest

of living syphilographers, declared to Medical Director Coues that syphilis had been virtually stamped out of Paris, when the advent of the German army re-introduced it; but he expressed his confidence that it would again be stamped out as before. Col. Fletcher of the Surgeon-General's Office of the United States Army writes to your Committee: —

"In 1863, while I was on duty in Nashville, the question of the periodical examination of prostitutes, as a protection to the troops stationed at or passing through that city, was referred to another medical officer and myself. We drew up regulations for the purpose; and for nearly three years the women were examined, at first every two weeks, but subsequently every ten days.

"I believe this was the first occasion of any systematic inspection of prostitutes attempted in the United States. Its results may be briefly stated thus: —

"1. The amount of venereal disease was markedly lessened; so much so that its occurrence came to be looked upon (absurdly, of course) as an imputation on the care of the examining surgeon. I have more than once known a company officer complain that a man was off duty for disease caught of such a girl at such a time, and demand that she be sent to the hospital.

"2. The women, who were at first rebellious, became quite reconciled to the system. I have known them come to the hospital voluntarily, desiring to be examined for suspected disease.

"3. It was self-supporting, the fees paying the expenses of the hospital."

To-day the Nashville prostitute advertises herself in big gilt letters over her front door, before a blazing light, more conspicuously by far than were she enrolled on a police register; while purblind virtue and false morality stalk by, and leave no other guaranty to society than the poor creature's own good sense, that her house shall not become a focus of disease as disastrous as small-pox or diphtheria.

In ten years, the Surgeon-General of the Navy is authority for stating, the amount of venereal disease on the Asiatic station has fallen from 425.8 per thousand to 112.1, — a difference of 313.7 per thousand, due to the examination of prostitutes practised at Hong-Kong and in Japan, and the seclusion of infected women in lock-hospitals. The scandalous scenes which disgrace the chief thoroughfares of Liverpool and London and New York are no longer possible in cities like Paris and Lisbon and Hamburg, where public women are under police surveillance; nor is it true that clandestine prostitution attains such enormous proportions in places where the Gan Keiro or Yoshiwara confines the whore, as in Japan, or where, as in Marseilles, the temples of Venus Meretrix have their own secluded quarter, to be shunned by the virtuous, that it does in Philadelphia and Brooklyn and Boston, where the respectable woman is jostled in every street by unsuspected courtesans, and unfledged boys are lured to disease by young girls in the garb of decent poverty.

If the Contagious Diseases Acts of England have not accomplished all the good contemplated, it is because those Acts have not been stringent enough. If syphilis re-entered Paris after having been once stamped out, it was because every avenue for its approach was not carefully guarded. "Doubtless," says

Diday, "a sensible progress has marked the beginning of this century. With the establishment of a better regulated surveillance, we have seen the coincidence of the diminution of the number of venereal affections; but the persistence of the scourge is an evidence of the insufficiency of these measures." "How is it, then," asks Fournier, "that syphilis is especially derived from inspected women? It is, on the one hand, because the relations with this class of women are more numerous; and, on the other, because the surveillance which is exercised over them is completely insufficient." The idle charge, endeavored to be substantiated by figures, that the inspection of public women has only induced a greater amount of disease, is not worth refuting; but the insufficiency of these inspections is evident, —

Because, while discovering women who are diseased at the weekly or semi-weekly visit, it leaves them unprotected against the intermediate approaches of infected men, and the unconscious contamination of their subsequent visitors;

Because minute abrasions, hidden deep in the vagina or among its *rugæ*, may escape detection;

Because a woman may undoubtedly be the vehicle of communicating disease from one man to others, without herself becoming infected;

Because women who are not avowed and registered prostitutes — shop-girls, domestic servants, saloon-attendants, ballet-girls, choristers, kept women, and the like — are exempt from examination; and chiefly,

Because it ignores the men, who are the original contaminators of the prostitute.

Furthermore, in this country at least, it is a fact that prostitutes, except those of the lowest class, have learned that it is their own interest to keep well. There are few public houses which do not now have their regular medical attendants, who examine the inmates, and treat them when diseased; and the first lesson taught the young harlot is, to carefully inspect her male visitor, however gentlemanly his exterior. As the erring country girl brings forth the fruit of her illicit amour as promptly as if wedded, because ignorant of her sinning city sisters' devices to avoid such a calamity, so the poor shop-girl, unaware of the sanitary value of syringes and astringent lotions, is diseased by the well-dressed admirer who has turned her head, when the professional whore would have driven him from her room. The young libertine of this day, can, consequently, visit brothels with little risk. The sentimental objection that their location is thereby published and their nefarious trade advertised, is of little weight beside the fact that the young man, bent upon sinning, might be saved from irretrievable ruin, who, with no less moral turpitude, consorts with the shop-girl whose favors are bought with cheap jewelry, or the housemaid whose chamber is conveniently near his own, and who gratifies him without charge.

While believing that the police registration of brothels and their restriction to designated quarters under sanitary surveillance are in the interest of humanity and morality, and that this no more implies the recognition and

countenance of the sin of immorality than the license of rum-shops and the taxation of whiskey-stills presuppose the encouragement of intoxication;

Believing that the toleration and connivance, through pretended ignorance of their existence, of bawdy-houses, bed-houses, cheap lodging-houses, spurious dressmaker's rooms and cigar-shops, dentist's offices, and other notorious places of resort, and the freedom of exposure permitted in public places to the most abandoned and unmistakable strumpets, are the most monstrous blots upon the civilization of this century, and infinitely more reprehensible than their repression and sanitary and disciplinary control by their authorities, your Committee, nevertheless, consider this to be rather a question of public morals than of public health; and they therefore now only recommend, as, in their opinion, the most effectual, practicable means of preventing the spread of venereal diseases, the enactment by the legislatures of the several States of a law constituting it a criminal offence or misdemeanor to communicate, or to aid or abet in any way the communication of, a contagious disease, such as small-pox or syphilis, and empowering and requiring health officials to establish such regulations as may be necessary for the prevention, discovery, treatment, and suppression of such diseases.

Deterred by the fear of public accusation and its consequences, no diseased man would, thereafter, venture to cohabit with any woman, whether public harlot, clandestine strumpet, or his own wife.

Satisfied that the law would punish the unscrupulous wretches who have hitherto so cruelly wronged them with impunity, no woman would care to evade its application to herself; and not only the poor panderer to man's lust would have a greater incentive to preserve her personal cleanliness, but the proprietors of the bawdy-house would be equally responsible for and equally interested in the physical welfare of its inmates.

Inspections would be cheerfully submitted to or voluntarily solicited; and only those perversely negligent of sanitary observances, and the degraded *habituées* of the lowest slums, would become subjects of sanitary constraint, and, with the professional burglar and black-leg, be treated as forever objects of suspicion.

It might open the way to false accusations by abandoned women, but they who object to any semblance of protection of vice can hardly find fault with this additional impediment to sensual indulgence.

Under the operations of such a law, it would become the duty of every physician to exact from his syphilitic patient that voluntary isolation or seclusion which may be necessary to prevent contamination, under penalty of punishment of the former for his neglect to advise, or of the latter for his refusal to conform to the advice. While it is manifestly impracticable to require a physician to confine his syphilitic patient in a pest-house, it is nevertheless his legitimate office to instruct him to shun such contact with his fellow-beings as may expose them to the risk of contamination. Military and naval medical officers already have, and the surgeons of the Marine Hospital Service and those of emigrant and passenger ships ought to have, the right to ascertain the

condition, and the power to restrain the liberty, of diseased men and others under their charge.

For the syphilitic who marries and contaminates an innocent woman, and begets a diseased child, the law can scarcely frame an adequate punishment, while no code of ethics should permit a medical practitioner to screen his infamy.

The plan proposed by your Committee implies the appointment of sanitary officers in every hamlet, village, town, and city of the country, subordinated to and controlled by county, municipal, or State Boards of Health, and empowered to investigate and discover every preventable cause or form of disease, syphilis included. They further recommend the establishment of special or lock hospitals for the gratuitous treatment of all venereal affections, and, in the absence of such hospitals, provision for their treatment without charge and without unnecessary exposure of their victims by health officials under whose cognizance they have come, since, as Dr. Beardsley has well stated, "the cost of treatment for venereal lesions has become so heavy, the prices so exorbitant, that thousands are deterred from consulting a physician through fear of being fleeced." Professor Andrews quotes the case of a private-diseases doctor, one of a dozen in Chicago, whose receipts in a single month amounted to two thousand dollars. The special hospitals suggested would naturally supplement and not wholly supplant the private charities, dispensaries, and special wards in general hospitals for the treatment of such as might be reluctant to enter the former, which, however, it is believed, might, by thoroughness and care in treatment, not only attract a large proportion of unfortunate sufferers, but ultimately become the means of accomplishing the reformation of many whose doings had led them thither to seek relief.

The plan proposed by the Committee of the American Medical Association, consisting of Doctors Gross of Philadelphia, Marion Sims of New York, N. S. Davis of Chicago, John Morris of Baltimore, and J. M. Toner of Washington, at Louisville, Kentucky, in 1877, though in the same direction, is less comprehensive than that of your Committee. They reported, "That, in their judgment, there is no possibility of stamping out syphilis until all the nations of the world are protected by proper legislative measures. Great difficulties, unfortunately, surround the execution of laws having for their end the prevention of syphilis; and it is impracticable, at the present time, in view of the ignorance and prejudices of men, to secure more than partial legislation looking to this purpose. We can, therefore, only hope to obtain the passage, at first, of enactments having in view the regulation of persons engaged in the military and naval service of the government, and also those ordinarily subject to the control and supervision of the police and municipal authorities of cities and large towns, though in the end we are convinced that the extension of this control and supervision to the whole civil population will be the inevitable legislation of all countries."

Your Committee have contemplated this wider application of the law in the plan they have unanimously concluded to submit, and which it only remains for them to formulate in the following resolution: —

Resolved, That the American Public Health Association earnestly recommends the municipal and State Boards of Health to urge upon the legislative bodies of this country the enactment of a law constituting it a criminal offence to knowingly communicate, or to be instrumental in communicating, by any direct or indirect means, a contagious disease, such as small-pox, scarlet fever, or venereal disease, and giving to said Boards of Health, and to the State and municipal health officials under their control, the same power in the prevention, detection, suppression, and gratuitous treatment of venereal affections, which they now possess in the case of small-pox and other contagious diseases.

Respectfully submitted.

ALBERT L. GIHON, M.D.,
Medical Director U. S. Navy, Chairman.
J. M. KELLER, M.D.,
Hot Springs, Ark.
GEORGE M. STERNBERG, M.D.,
Surgeon U. S. Army.
D. C. HOLLIDAY, M.D.,
New Orleans, La.
PRESTON H. BAILHACHE, M.D.,
Surgeon U. S. Marine Hospital Service.
WILLIAM E. GRIFFITHS, M.D.,
Brooklyn, N.Y.

III.

THE REPORT OF THE NEW ORLEANS MEDICAL AND SURGICAL ASSOCIATION

ON PROPOSITIONS SUBMITTED BY THE EXECUTIVE COMMITTEE UPON QUESTIONS RELATING TO PREVENTION OF THE SPREAD OF DIPHTHERIA, SCARLET FEVER, YELLOW FEVER, MEASLES, SMALL-POX, ETC.,

By Dr. D. C. HOLLIDAY
Of New Orleans.

Question 1. What are the best means of securing prompt and reliable information as to the presence and location of cases of such diseases?

Answer. It should be made obligatory by law, under a penalty, for physicians and heads of families to report promptly all cases, even suspicious cases, to the health authorities, whose duty it should be to investigate such cases, and report them without delay to all other interested communities.

Q. 2. What are the best means of securing isolation of the first or single cases of such diseases, and what are the chief difficulties in securing such isolation?

A. The chief difficulty is to secure the cordial co-operation of the medical attendant and of the family. With such co-operation the sick person can be visited only by the physician and those in immediate attendance. Without such co-operation, cases of small-pox should be removed to a small-pox hospital, unless removal endangers life. The presence of dangerous infectious diseases should be indicated by a flag or placard fixed conspicuously on the house, and guarded by a sanitary policeman. The term "isolation" implies the placing of the patient in a separate building, not in another room in the same building: in case of small-pox, typhus and scarlet fever, partial isolation cannot be depended on. If a room must be chosen in the same house, a room in the top story should be chosen.

Q. 3. Under what circumstances is it proper to declare such diseases epidemic in a place?

A. If the number of patients in a city or place afflicted with one of the above diseases, in a given day, amounts to, for a population of

100	. . . . .	5 per cent,	5
200	. . . . .	5 " "	10
300	. . . . .	5 " "	15
400	. . . . .	5 " "	20

500	4 per cent,		20
600	4 "	"	24
700	4 "	"	28
800	4 "	"	32
900	4 "	"	36
1,000	4 "	"	40
2,000 to 5,000	22½ "	thousand.	
6,000 to 10,000	16 "	"	
20,000 to 50,000	8 "	ten thousand.	
50,000 to 100,000	4 "	"	"
200,000	1 "	"	"

Q. 4. Under what circumstances is it proper to recommend the closure of schools on account of the prevalence of such diseases?

A. When the disease has been declared epidemic. It might be advisable for parents to withdraw their children even earlier.

Q. 5. What precaution should be taken at the termination of each case as to —

(*a*) Care and disposal of the dead?

(*b*) Disinfection and cleansing of the room of the house?

(*c*) Period of time at which it is safe to allow the convalescent to return to school and society?

A. (*a*) Immediate private burial. The corpse should be closely coffined, and surrounded with pulverized charcoal as soon as possible after death or cremation.

(*b*) Isolate as far as practicable the locality where such cases have occurred, and delegate to the authorities sufficient power for a thorough and repeated disinfection and cleansing. All bedding and clothing of patients should be thoroughly disinfected by dry heat not less than two hundred and fifty degrees Fahrenheit, or destroyed.

(*c*) Desquamation in the eruptive fevers should be completed before the patient should mingle with others; in regard to the others, after complete convalescence.

RECORD AND DISCUSSIONS OF EACH DAY'S PROCEEDINGS.

DEC. 7–10, 1880.

PROCEEDINGS AND DISCUSSIONS AT THE EIGHTH ANNUAL MEETING.

NEW ORLEANS, LA., DEC. 7–10, 1880.

TUESDAY, DEC. 7.

THE Association convened at Grunewald Hall, and was called to order by the President, Dr. JOHN S. BILLINGS, at ten A.M.

The meeting was opened with prayer by the Right Rev. JOHN S. GALLEHER, D.D., Bishop of Louisiana.

The names of several candidates for membership were presented by the Executive Committee, and the candidates elected members of the Association.

The local committee reported through its chairman, Dr. SALOMON, who announced that the invitation of Hon. H. P. Kernochan to visit "Scarsdale," his plantation on the lower coast, had been accepted, and that the Executive Committee had fixed Saturday next at ten A.M. as the day and hour the start for the plantation would be made.

Dr. SALOMON requested members who purposed making the trip to leave their names with the local secretary.

He also announced that members of the Association wearing badges were accorded free transportation on all the street-cars, excepting those of the St. Charles Street and Crescent City Railroad Company lines, and that domestic despatches by members would be transmitted by the Western Union Telegraph Company free of charge.

The Secretary read the following resolution adopted by the Executive Committee: —

Resolved, That the rules contained in Roberts's Manual be adopted to control the proceedings of the Association, and that speakers be limited to ten minutes, the President being authorized to reduce the time to five minutes, if at any time necessary, for the purpose of affording to every one who may desire an opportunity to speak.

The report of the Treasurer, Dr. J. BERRIEN LINDSLEY, was received.

It showed that the receipts during the year, including the balance at time of last report, had been $3,622.96, and the disbursements, $2,917.56; leaving a balance of $705.40.

Drs. Plunket, Steuart, and Walcott were appointed an auditing committee to examine the accounts of the Treasurer.

Dr. GUSTAVUS DEVRON of New Orleans read a paper on "Abattoirs."

Dr. BUSHROD W. JAMES of Philadelphia read a paper entitled "How Abattoirs improve the Sanitary Condition of Cities."

Dr. Joseph R. Smith, U.S.A., read a paper on the "Texas Cattle-Disease."

Discussion.

Dr. J. H. Rauch of Illinois, in opening the discussion of the paper, said, "I have listened with interest to the paper of Dr. Smith; and I think, both from a sanitary and a commercial stand-point, this question is an exceedingly important one.

"In 1868 Illinois lost between one and two million dollars from what is called Texas cattle-disease. Circumstances compelled me, as sanitary superintendent, to investigate this disease, and recently have called my attention to the fact that this disease seriously interferes with the exportation of our cattle abroad. I am pleased and delighted to see that this question is taken up in Texas. The fact that this disease exists is made use of, not by the British Government alone, but by the Canadian Government, as an excuse for discriminating against all American stock shipped abroad. While I have never yet been able to trace any direct injury from the consumption of the meat of animals who suffered from this Texas cattle-disease, still, on general principles, I consider it injurious.

"The commercial aspects are certainly very important. If the Texas cattle-disease did not prevail among our native stock, the Privy Council of England would not discriminate against the stock of the United States as it does. It is true, pleuro-pneumonia is another ground for discrimination; but this Texas disease is made use of to a great extent. If the American stock-shipper could send his stock into the interior of England, instead of killing them on landing, it would make a difference of twenty-four dollars per head.

"In consequence of this disease you will find trouble throughout all the Eastern, Middle, and Western States. Various States have passed laws on the subject. For instance, Illinois passed a law that no Texas cattle should be allowed to enter that State from the 1st of May until Oct. 1; but the law was declared unconstitutional. I have carefully examined the decisions of the court, and I am satisfied they are correct. It was simply an embargo. It was interfering with interstate commerce, which no State had a right to do. If the cattle had been inspected, if that precaution had been taken, if the question of sanitation had been brought in, the law would not have been declared unconstitutional. The governor of Illinois will, in a short time, recommend the passage of a law by the State of Illinois with regard to this question, which is constitutional. I believe this question can be handled, — that it can be managed, both in the interests of sanitary science and commerce; and I have so informed the governor. I believe, too, with the assistance and co-operation of Texas and other States, it can be managed without trouble.

"Several years ago we thought we had the cause of this disease, but we were mistaken. We thought we had the germ, but every thing we proved one year was disproved the next. We know nothing with regard to the cause of this Texas trouble.

"My idea has been to place inspectors (competent men) at the stock-yards, and have a place where we can quarantine cattle, — applying the same rules to the cattle-trade that we do to yellow fever. We should have the history of a herd starting from Texas, of all the conditions and changes that take place when they reach Chicago or East St. Louis stockyards, and, if there is any trouble or suspected trouble, have a place where they can be quarantined. This is a matter that appeals to the commercial interests of the country. I know no better field for work such as this Association is organized to do, and therefore hope that the investigations that Dr. Smith has commenced will be continued; and, as far as Illinois is concerned, we will co-operate with him, — Illinois at one end of the line, and he at the other."

Dr. J. D. PLUNKET of Tennessee said, "The discussion of a question involving so much as this does, both commercially and scientifically, is, I think, especially called for at this time. And, as the gentleman who has just taken his seat remarked, it is with especial gratification that I see Texas is moving in this direction. Upon the platform I see Dr. Harris of New York, who a few years ago prepared a report on the subject, which, so far as the pathological aspect is concerned, is the ablest I have ever seen. I would like to hear this morning if he has arrived at any later conclusion, or has any additional views to express on this matter."

Dr. ELISHA HARRIS of New York said, "I will not occupy any moment of the morning unnecessarily. This has a sanitary aspect, which Dr. Smith, without special argument, has opened. He says that the Texas cattle, as we well know in our Eastern markets, arrive at their market-places on the lines of shipment without visible disease, and without any considerable mortality. That has been the history ever since the great transportation lines were opened by rail, and, indeed, when they went overland.

"In 1868 Dr. Rauch, Sanitary Superintendent of Chicago, Ill., and the Metropolitan Board of New York, were in communication on the subject, being daily witnesses of dying cattle of the most extraordinary fatness and beauty, that were arriving, or found in the cattle-yards, in those States respectively. At the same time, on the same days and weeks and months, beginning in August, one of the largest owners and shippers the country has ever had, Alexander & Son of Illinois, put themselves in communication with me for certain purposes of inquiry, gave me all the facilities that their generosity could give, for giving the cattle bodily to the sanitary inquirers in New York who would consent to follow up the investigation, and ascertain what was the connection between their dying native stock and those herds shipped over the same lines. We never saw in one city dying Texas cattle. We have seen what all have seen continuously who have witnessed the arrival of those animals, fierce, wild, thin, scrawny, who might be called sick because of their very dulness of coat, the condition of the hair, and other signs of unhealthfulness. But those cattle to-day remain living and vigorous, notwithstanding they left death in their trail. Even the present summer, in one of our healthiest counties, a small number arriving on a certain day, and put in a certain pasture, left behind this record of themselves, as has occurred again and again in the State of New York.

"This year the events marked precisely what I beg to call Dr. Smith's attention to when we have had any fatality among our native cattle from the Texas herds. After the Texas herd has left the pastures or yards, within sixteen days — from sixteen to twenty days — the native cattle fall sick of a disease which is almost without exception fatal, and which has been reported everywhere in this country as Texas cattle-disease, etc.

"Now the point that interests us as sanitarians especially, at least the point which led to inquiry in New York, and led Dr. Rauch to so much labor in 1868, is this: If cattle not visibly sick, and never known to be the victims of a disease fatal in its nature, do become the carriers of a disease, and in some manner cause its propagation, what may this not teach us concerning the source of an infection which may be very fatal to certain localities, while it may be indigenous, or an almost unknown cause of unhealthfulness, in another? Professor Law of Cornell University examined one of these herds, and reached a conclusion which was communicated verbally to the New York Board of Health, and which will appear in the report of the Board, that the herd of native cattle in Oswego County must have contracted the disease from a herd of apparently healthy cattle that twenty days before occupied the same pasture.

"The line of inquiry being pursued by the veterinary scholars and the sanitary officers throughout our country promises much. It is desirable that in Texas, and anywhere that this disease occurs, there should be accurate pathological inquiry into the condition of those herds which seem to be unhealthy. They do not perish. But we have this testimony that the native herds on going South do perish of this same disease.

"In New York this question has the attention of the most eminent veterinary observers, and I trust the subject will receive the continued attention of this body."

Dr. SMITH said, in closing the discussion on his paper, "I only desire to say, that, in the information which I am collecting on this subject is included the pathological appearance of all cattle killed for beef at quite a number of places; and these appearances are not to be reported as interpreted by the observers: but definite information is desired as to color, size, etc., and, wherever possible, microscopical appearances, fatty degeneration of the liver, etc."

Dr. EZRA M. HUNT read a paper entitled "The Sanitary Association of Lynn, Mass.," prepared by Dr. J. G. Pinkham of that city.

Discussion.

Dr. DEVRON of New Orleans, in opening the discussion, said, "In the paper just read we have had an account given of the public masses formed into a sanitary association for the purpose of creating a board of health. In the city of New Orleans we have had a different spectacle. We have had a board of health existing for years, without sufficient means for its work, and having, through misfortunes, lost the confidence of the public. We have formed an association of the citizens for the purpose of bringing back the public to a

love of hygiene and the respect which the board of health should have at their hands. In 1878, at the end of the epidemic, the public had lost faith in all hygienic measures. It knew not whom to trust. The citizens of New Orleans organized the New Orleans Sanitary Association, called upon all citizens to contribute to assist in purifying the city and aiding the board of health. The widow gave her mite with the money given by the millionnaire. The beauty of the organization is, that, though having the power, and being intrusted with the funds of the public, they did not aim to supersede the board of health. They were too modest. They assumed the name of the Auxiliary Association, having the money and willing to assist the weaker body. What has been the result? In 1879 the dread fever again appeared in the fourth district, when at once the Sanitary Association began to collect money from the people, and commenced to purify that neighborhood, and placed at the disposal of the board of health sanitary police, which their means did not enable them to employ; and, with the help of the National Board of Health, the disease was wiped out.

"The Association, having accomplished that much, began to look around for other work; and it commenced last year the matter of cleaning the gutters of New Orleans. In less than six months one-half the gutters of New Orleans, covering a distance of nearly three miles, were flushed with water from the Mississippi River at an expense of less than $45,000, contributed by the people, when the city government of New Orleans, with its machinery, power, and engineering skill, had spent $110,000, and accomplished no permanent results. By April, with $35,000 more, the Association will have flushed and purified every gutter of New Orleans. The Association does not intend to stop there. It intends to go step by step, year by year, collecting money to improve the city and protect the health and lives of its citizens. The next matter will be sewerage and drainage of New Orleans. So we will go on improving year by year, until New Orleans will be second to none in its sanitary condition."

Dr. W. G. Austin of New Orleans said, "While I agree with the last speaker, I must inform the Association he has left out the most important auxiliary that helped to stamp out the epidemic of 1879 in its incipiency. I refer to the National Board of Health, who gave us money. We used it, and used over two hundred barrels of disinfectants, and removed a great deal of filth from the district infected by the means the National Government gave us. I, acting as president in the absence of Dr. Choppin, who was sick, know that Dr. Bemiss stood up to us, and gave us every aid possible, backed by the National Board; and, but for that money, we never would have been able to do what we did. The Auxiliary Association worked manfully and nobly; but without the aid of the National Board we could not have accomplished what we did. Here is my friend Dr. Bell of 'The Sanitarian:' he knows what a condition the city was in at that time.

"I merely propose to do justice to the National Board of Health, which I considered an experiment at the time; but I believe, if Congress will pass

proper laws giving it the requisite power to act, we will see none of these petty quarantines against New Orleans. We will have a system that is worth something to the country."

The committee appointed to report a plan for the prevention of the spread of venereal diseases, reported through the chairman, Dr. Albert L. Gihon, Medical Director U.S.N., who, in conclusion, offered the following resolution : —

Resolved, That the American Public Health Association earnestly recommends the municipal and State boards of health to urge upon the legislative bodies of this country the enactment of a law constituting it a criminal offence to knowingly communicate, directly or indirectly, or to be instrumental in communicating, a contagious disease, such as small-pox, scarlet fever, or the venereal diseases, and giving to the said boards of health, and to the State and municipal health officials under their control, the same power in the prevention, detection, suppression, and gratuitous treatment of venereal affections, which they now possess in the cases of small-pox or other contagious diseases.

It was moved by Dr. Jones of Indiana, and seconded, that the resolution offered by the committee be adopted by the Association.

Discussion.

Dr. Ezra M. Hunt of New Jersey in opening the discussion, said, "I heard with a great deal of interest the paper read by Dr. Gihon, but I think that an association like this needs to be careful in committing itself to any system of legislation. We are well aware that the relations of this disease are different to the public morality, and there is such a different sentiment abroad among those who are well advised in this matter from what there would be with reference to small-pox or scarlatina. You are also well aware that this paper of Dr. Gihon, read at the last meeting, has excited the largest attention, and, I may say, the loudest protest, of many of those who cannot be dismissed by being called pseudo-moralists, those who present statistics who are not to be passed by with a sentence which says they are not worthy of regard. The matter was brought before a convention at Geneva. There were five hundred delegates present from fifteen different countries, and, after spending a long time in its discussion, a conclusion was reached unanimously, contrary to the general spirit of this paper. England and France are now overhauling their contagious-disease Acts ; and it seems probable that even Italy is about to give up its system, — the regulation system which has heretofore been in operation. When we remember all this, I say, we should hesitate before we attempt to assume relations to the legal and moral aspects of the subject. I think a temperance orator might depict the desolations of drunkenness and the evils of the alcoholic habit, and it would all be true and it ought to elicit sympathy ; but when you ask me to advise a particular system of prohibition, when you ask me to advise any license system, when you ask me to pass laws in regard to that matter, I say it is quite a different thing, and I am not ready to commit myself to any such action.

"It seems to me it is enough for us to spread this paper among our transactions, and let it be read. As a member of the State Board of Health I am not willing that this Association should instruct me to go home and urge upon the Legislature of New Jersey the passage of such laws as are here suggested.

"There are a great many things with regard to statements in this paper, which I have no doubt are thoroughly believed to be true; but the gentleman who presents this report, in his navy relation, sees a far different field from what I do in my State: and I am not willing, from my stand-point, to be called upon and advised to urge the passage of such a law as that indicated in the resolution. Therefore, while I fully appreciate the noble presentation of this as a sin, as an evil, yet I say we are not called upon as an association to come forward and present a definite system for legal enactment, any more than in relation to intemperance we are called upon to deliver to the world the precise form of a license law, or of punishing men for getting drunk, which is somewhat parallel to this. For these reasons I cannot favor the resolution; and I move, as a substitute, —

That that report be adopted, with a statement that the Association is not now prepared to express an opinion as to the best legal method of preventing diseases."

Hon. Erastus Brooks of New York said, "I am here as a delegate from the State Board of Health with my colleague Dr. Harris. I have listened to the report just read with intense interest. I am appalled by the facts which it communicates through this Association to the country; and, if the report makes a record of facts, it seems to me, as a delegate here, as a member of the State Board from the great State of New York, that some emphatic expression of opinion becomes a public duty. I am glad the subject has been presented. I think that the discussion of it cannot fail to produce great public good. I think the transfer of the subject from this hall to the legislatures of the several States for their consideration is a matter of public importance; that, if the discussion which commences here can reach the several States of our Union, so that in thirty-eight bodies and territorial legislatures of the country we are prepared to discuss in a becoming manner such an appalling state of facts affecting the interests, the welfare, and the health of every member of the community, we cannot afford to evade the consideration of a subject of such vital interest to every man, woman, and child in the whole community.

I am not prepared to state whether this is the best way to do it or not; but the impression made on my mind was, while listening to the paper, — the material facts of which, I will venture to say, ninety-nine hundredths even of the intelligent people of the country are ignorant of, — that you cannot afford, in the language of the substitute, to evade a more material consideration and a more truthful recommendation of what becomes your duty as delegates by merely, on considering the report, asking that it be laid aside for some future consideration and action hereafter. All that your committee recommends is, that this subject be brought to the attention of the legislatures of the several States; and if, I repeat, the facts embodied in that report are true, or if there

is even an approximation of the truth, I think every father, every mother, every man, woman, and child in this great country of ours, has an intense, practical interest in the consideration of a subject like this."

Dr. A. N. Bell of New York. — "I think this body ought to be ashamed to shrink or shirk from the consideration of any question affecting the public health. I am surprised, sir, at the position taken by one member of the Executive Committee on the report presented by his co-member, because he at least is contemporary with myself in his relations to this Association, which was organized for the doing of every thing and any thing to put down that which is in conflict with the public health. We have here, fortunately, as members, men who can present the question from the moral stand-point. We have among us distinguished divines belonging to this Association: let them come out and say whether it is improper to carry this subject before the legislatures, whether we shall have the courage to carry it before the people, or whether we shall shrink back and say it is a delicate question, and we cannot present it to the country. I do not wish to occupy the floor on a subject of this kind, because I feel my opinions are sufficiently well known, but will yield to others who wish to speak."

Dr. J. P. Dake of Tennessee. — "It strikes me that the original resolution contains nothing that is exceptional, nor that the amendment sets aside any thing in the resolution. It is not proposed in the original resolution to institute any of the objectionable measures to which the gentleman has referred who has offered the amendment. It is simply placing the responsibility with regard to the communication of this disease where it belongs. It is not proposed to legislate against this thing as a sin. We are not touching the moral part of it, but the physical evils. The paper which was read in our hearing, the paper read last year, and many other communications that have been published, show these evils distinctly and fully, until they are truly appalling. I would like to see an amendment to the original resolution that shall recommend the various boards of health to have communications published by the press of the country, so that the people may be educated in this matter, and their eyes opened to evils of which they dream but little."

Dr. E. M. Hunt of New Jersey. — "I have that right, which belongs to every member of the Association, of expressing my views; and I have desired to do it in the resolution I have presented. The report read presents to us the idea that in every town and parish there should be an organization. It says, almost in so many words, — and it certainly is the spirit of the paper, — that the only reason such acts as those tried in Europe are not called for is because we are not ready for them, and that the time will come when even practitioners of medicine must be held responsible to the law for any oversight in this matter. I, for one, decline to commit myself to such legislation on this subject. I recognize Christian expediency as a part of Christian duty. I will not shrink from any duty which belongs to this Association; but I am not willing to commit myself further than the American Medical Association committed itself: and I do not think we should go so far as to pass this resolution in the form presented to us."

Dr. ATCHISON of Tennessee. — "I think this is the best place we will ever find to go slow. Let us take it easy. There is very great danger, possessing the knowledge we do of the magnitude of the evil in all its relations, moral as well as physical, that we will attempt to accomplish too much, and in the attempt accomplish nothing. Reform is a very delicate thing: it is a very difficult thing; and those who undertake to force reform are very apt to feel the recoil. Above all, appeal to legislative force, legal force, in aid of moral reform has never achieved any thing in any direction. Take this question into the courts, and it will become public obscenity. We are compelled to bear rape: don't force us to bear any heavier burden. Our courts of justice would be a most obscene rendezvous for all that is repulsive and disgraceful, if these diseases are to be brought into the courts and prosecuted. The work of this Association is progressive and necessarily slow: it is educational in its character. Every physician in his sphere is an educator. Let him first inform himself, then inform the circle with which he is surrounded. Let us build up better knowledge in the community, and inspire wholesome dread of its terrors. Living in a rural district, I am not prepared to accept the statistics of hospitals. The blood of the mountaineer of Tennessee is uncontaminated. The disease is not so widely spread in our country. It has not the magnitude which it would seem to have by the report of the gentlemen, which is no doubt correct. I am opposed to legislation on the subject. I think it will accomplish nothing, rather hinder the accomplishment of good. I am for the publication of the report as a means of education. I would have no objection to boards of health issuing clean, clear-cut statements, warning the people of danger, if you please, but no legislation. Let us not be in too much haste to appeal to Cæsar: we can do our work better without Cæsar's help."

Dr. J. P. DAKE of Tennessee. — "I would like to add a single word. I believe it is a wise maxim for bodies like this to make haste slowly. I understand that all that is asked by the resolution is, that the subject be brought to the attention of the legislatures of the several States. I believe it will have the effect of educating the people to the extent of the great evil doing great physical and moral wrong to the community at large. I would like to ask my friend from Tennessee what possible harm can come from the presentation of a subject like this to the respective legislatures of the several States, if the only effect would be either the enactment of proper laws for the prevention of a great public abuse, or the proper discussion of a question which will tend to educate the people by bringing the public mind and attention to a subject which all must admit is of immense importance?

"Now, we are not asked to adopt the report, as the gentleman from New Jersey has said: we are simply asked to bring to the attention of legislatures of the States this subject; and, when a vice is knowingly committed and knowingly communicated, then it shall become a public offence. That I understand to be the length and breadth of this resolution."

Dr. WIGHT of Milwaukee. — "This Association is made up in great part of medical gentlemen who understand the nature of this disease and its public

effects. They are familiar with its literature. The evil is admitted. Its magnitude is great. The public health is affected by that disease perhaps more than by any other single thing under the sun. The question is understood; the facts are known by this public body. The facts being known, and the question being understood, it seems to me that we, as a body, should entirely ignore the subject if we pass the substitute offered by the gentleman from New Jersey. It declares that we are not ready to pass on this subject in any form as yet. It is a polite way of saying, "Get behind me, Satan: we will have nothing to do with you." Yet we are brought in contact with the disease everywhere just as described in that paper before us. My heart has never been so wrung as when, at the lying-in bed, I have innocent women and babes afflicted by this disease, communicated — and communicated perhaps knowingly — by men responsible morally to these beings; and we are asked by this resolution closing this report to petition legislatures to punish the wretch who knowingly communicates this disease to the innocent.

"It is not a question of licensing houses of prostitution: it is not a question of repeating the legislation of Europe. It is a totally different thing. We are simply asked to petition the legislatures of our States to enact a law to punish the human being who knowingly communicates this disease to another human being, — not only this, but any other disease. We need a statute to-day making it a crime or a high misdemeanor to communicate small-pox, diphtheria, and scarlet fever. All of us engaged in the practical work of sanitation in the cities and States of the Union feel the need of a law on the subject. All we are now asking is, that syphilis be embraced in that law with the other diseases; and therefore I am decidedly in favor of the resolution of Dr. Gihon."

"One word with regard to my friend from Tennessee. He says it would shock public sentiment to discuss the subject in a court of law, and yet he says it is the duty of the health officer to instruct the community on this subject. There seems to me an inconsistency in this. The public-health officer, in sending out a communication to the public, discussing this matter, is just as likely — yes, more likely — to shock modesty than would the investigation of a criminal in a court of law who is charged with communicating this disease to some fellow-being. I am opposed to the substitute of my friend Dr. Hunt as ignoring the subject, showing an unwillingness — a want of courage, if you will — on the part of this Association to meet the question; and I am in favor decidedly of the more positive, yet very pertinent, resolution of Dr. Gihon."

Dr. S. T. Evans of Tennessee. — "I would say that I think this committee have asked us to do the very least thing they could. We all know something about this disease; every physician here knows something about it; and we all know that it is a terrible thing to spread, — that it is a terrible poison.

"Now, if I mistake not, by the statutes of every State in the Union you will find that it is a high crime to poison; that it is a high crime to introduce an epidemic disease knowingly into a place. This committee only asks us to place this disease with others of a like character. We cannot do less than say we are willing to place this along with other poisons. I was astonished to hear my

esteemed friend, Dr. Atchison, speak as he did. He knows that by the laws of Tennessee it is a high crime to poison any person, or any stream even; yet he asks us to go slow. I do not know how the Association can do less than the committee asks."

Dr. A. L. GIHON, U.S.N. — "Dr. Hunt has just suggested a modification of the resolution which will make it acceptable to himself. Although not able to consult with the other members of the committee, I think there will be no objection to the change, and omitting the reference to municipal and State boards of health. If, therefore, the Association will allow me, I will omit those references."

Dr. T. A. ATCHISON of Tennessee. — "I ask to be indulged in one word of explanation. My opposition to the resolution is on the ground that legislation will hinder, rather than further, the work of reform. Such has been the experience in all matters of religious and moral reform. We can do better without legislative interference. My allusion to the courts of justice being burdened with such indecent exposure certainly will be justified by the experience of every gentleman. The difficulty of obtaining proof, dealing with the characters it deals with, multitudinous sources of infection, malicious depositions, false accusations, will multiply and prolong litigation of an indecent character, which will be worse than washing our dirty linen on the front porch. Let us bear in mind there is such a thing as moral pollution as well as physical, and the more you familiarize the public with vice the greater will be its spread. This is a proposition that cannot be disputed. Let us go on with the work of reform ourselves. Let us indorse the essay of Dr. Gihon. Let it be published among our records. It will enlighten the public. This is the great fountain of sanitary light from which our communities are being rapidly educated in various directions. We are making grand progress: let us not hinder it by too much haste."

Dr. GIHON. — "I wish to call the attention of the old members of this Association to the fact that I have been four years trying to get this Association to do something. Now, that is slow enough, certainly."

Dr. HUNT withdrew his substitute.

On motion of Dr. ELISHA HARRIS of New York, Dr. Gihon was permitted to modify his resolution by striking out that part in reference to State and municipal boards of health.

Dr. S. T. EVANS of Tennessee. — "I think the original resolution the better one. All you will ever see or hear of the matter now will be in our own proceedings."

Dr. GIHON said that Dr. Atchison urged us to "make haste slowly." He would inform him that he had for four years been "making haste" to have action taken upon this subject.

The resolution was then adopted, the amendment being the omission of the words, "municipal and State boards of health."

The Association adjourned to three and a half P.M.

AFTERNOON SESSION.

The Association was called to order at three and a half P.M.

Dr. GIHON offered the following resolutions, which were read and referred to the Executive Committee without debate: —

Resolved, That all nominations of officers of this Association shall, before being submitted to ballot, have the indorsement or approval of a majority of the members present from the State in which the candidate resides.

Resolved, That the Executive Committee be instructed to communicate with the State and municipal boards of health throughout the country, and supply them with a copy of the Report of the Committee on Prevention of Venereal Diseases, and request their co-operation in the attainment of the object of the resolution submitted and adopted by the Association.

The following were likewise read and referred: —

By Dr. Le Hardy of Georgia, —

Be it resolved, That the order of business be so amended that all new business, all motions and resolutions referring to public health, be introduced upon the second day of the session of the Association, and upon no other, and that the discussion of all business so introduced shall take precedence of all other business upon the demand of any member.

Resolved, That a standing committee on general sanitation, composed of one member from every State and Territory represented in the Association, be annually appointed by the Executive Committee, each member of which shall be required to make an annual report to the Association of the sanitary condition and requirements of his State or Territory, the prevalent diseases, and other matters of interest to the Association.

The first regular business in order was a paper "On the Storm-Water Question in relation to Sewerage," by Col. George E. Waring, jr., of Newport, R.I.

Discussion.

Dr. O. M. WIGHT of Milwaukee, Wis., in opening the discussion, said, "A great deal might be said on the subject of sewerage. In the city where I have sanitary charge, Milwaukee, we have serious sewer problems to encounter, which have been under discussion for years. The matter has only been disposed of recently, but in a manner not entirely satisfactory to me. I agree most thoroughly, after a careful study of the subject, with the recommendation of Col. Waring, that storm-water and sewage proper should be separated, that they should not be conveyed from an inhabited place in a town or city through the same medium. The sewage proper of a town is a known quantity, or nearly known, — it is measurable and manageable. It amounts very nearly to the water used in domestic and manufacturing ways. The water-supply of a city, taken through our factories and habitations, becomes polluted with organic matter of various kinds, — the refuse of kitchens, water-closets, wash-houses, bath-rooms, manufacturing establishments, — and is thus rendered subject to putrefaction, from which process of putrefaction arises sewer-gas, which pervades the habitations of a town. The amount of organic matter which is

putrescent in sewage proper is also putrescible when the sewage proper is mixed with a large quantity of storm-water or with the land-drainage. Thus you have a much larger quantity to dispose of than when you confine sewage proper to one medium. It is very cheap comparatively to sewer a town for the disposition of the sewage proper, but it is not so cheap when you undertake to convey the storm-water together with the sewage. Storm-water is a variable quantity, and your pumping-works must be competent to dispose of the heaviest rainfall: whereas, if you have sewage alone, it being almost equal or very nearly equal to the amount of water used, you have a known constant quantity; and the expense of providing pumping-works for its disposal would be very less than in the other case. I know that in the city of Berlin, where the system has been carried out under the direction of one of the engineers of Germany, that the sewage with the storm-water is carried through five different channels to sewer-farms. The system is found to be well constructed and effective, but enormously costly, because they are compelled to provide pumping-works for pumping the entire rainfall of that city out on those farms.

"In another city, where the city was carried out under English engineers, the same difficulty was encountered. The storm-water and sewage were conveyed some nine miles along to a sewage-farm, two thousand acres of which have been rendered very fertile, where scarcely a tree would grow before. It cleans the town well; but the cost of pumping all this material is very expensive. Now, they could have separated the storm-water and the sewage. The sewage might have been pumped to this farm at a small expense, and the storm-water could have been run into an arm of the sea without much expense. Also at Berlin the storm-water could have been run into the river without any detriment to the city. Here, in New Orleans, if you undertake a system which should convey the storm-water and the drainage of the soil and sewage together, although it would not be an engineering impossibility, yet it would be enormously expensive; whereas, if you convey the sewage proper alone, it is the cheapest city in the United States to sewer. There are several advantages here for the conveyance of sewage proper not found in any other city in the country. In the first place, there is no frost. Your sewer-pipes could be laid near the surface without the necessity of laying them deep down. The natural inclination, some ten or twelve feet from the river back, would give sufficient depression for the flow of the sewage, and there would be no necessity for digging deep at any point. The water is close under the surface in the soil. Without digging deep, sewer-pipes could be laid in the water. For that reason wooden pipes would be more durable than iron ones. You have an ample quantity of cypress for the purpose. You can bore almost any length or any diameter, six inches up to two feet, and thirty or forty feet in length. Pipes thus bored, and placed below the water-level, would remain a thousand years. You have machines for making joints that are nearly tight when put together: a little cement in connection with those joints would make them impregnable to sewage. For these reasons New Orleans can be sewered cheaper than any other city in the United States to-day."

Professor WILLIAM H. BREWER of New Haven read a paper on the "Action of Muddy Water on Sewage."

Discussion.

Dr. A. N. BELL of New York. — "I desire to say a few words on this subject, because I can say it in New Orleans. It will not be new, by any means, to some in this presence, that I entertain the opinion that New Orleans can be sewered with great facility, cheapness, and on the very plans submitted by Col. Waring, and in no other way, I might almost say. I know of no stronger commendation of those plans than the fact of their adaptability to conditions in New Orleans, where the older system could not well be adopted aside from the expense. I was almost sorry that Col. Waring had not time to refer to some other singularly potent illustration of the gases which are given off in warm weather with such sickening effect, besides the great tunnel in Fourth Avenue, New York.

"When a storm comes, then comes the time of greatest danger, because the sewer cannot be full of both gas and water at the same time. As the water rushes in, the gases flow out, and in that way force traps and other openings in our houses.

"With regard to New Orleans, I hope the sewer-pipes will not be laid in wood. In the same trenches where you put these pipes, other pipes should be laid to get rid of the water.

"Professor Brewer has suggested something which he knows better than I do, — the precipitant effect of mud on water. All of us know, that, among the precipitants used for carrying down sewage, clay is one of the best.

"I hardly need detain the audience another moment, Mr. Chairman. I only have to thank you and the hearers for the opportunity of saying the few words I have on this subject, and calling attention to so important a matter as the sewering of New Orleans."

Professor BREWER. — "One word regarding small wooden pipes. Now, while wood would remain without rotting under water, you must remember, when you have a pipe partly filled on the inside, you have then a mixture of air and materials very putrescible, which tend to make wood liable to rot; and I question very much whether wood itself, conveying a mixture of air, gases, and sewage, would not rot very rapidly, even though the outside might be entirely under water. That is my impression."

Dr. J. W. HOLLAND of Kentucky. — "I should like to ask Professor Brewer a question. Near Louisville there is another city, New Albany, Ind.; and the water of both cities goes into the Ohio. I had reason to inquire into the water-supply, and I found the water of the two cities about the same. With a hundred and twenty thousand houses there is considerable sewage flowing into the Ohio; and yet, certainly, within two miles the water does not appear changed. The Ohio is very muddy. I have often been puzzled that there is not more chloride of sodium. I wonder why such a salt is not increased. It is possible that dilution accounts for it. I would like to know by what means we might

detect whether the uniformity of constitution is the result of dilution or change of organic matter."

Professor BREWER. — "I do not know of any. It has long been known that salt causes mud to deposit. Take a pint of Mississippi water and mix it with a pint of sea-water, and another which has not been so mixed: the one mixed with the sea-water will be clear, while the other is opalescent. It is one of the causes of formation of bars at the mouth of rivers. When the water comes down, the salt aids the precipitation of the mud. All of the salts of ammonia will do this. Salt with those things which are soluble and will crystallize will do this. Substances which will not crystallize — soap, glue, glycerine, and such things — rather retard this action; but still there are some of these organic substances which do not crystallize which cause rapid deposition of clay.

"My belief is, that the suspended clay in the water forms a chemical union with some at least of these heterogeneous substances, and either turns them into soluble forms, or in some way changes them. I do not know what these changes are. I drew up this paper that others might continue this study. It was a suggestion more than a statement. I merely throw out these suggestions, that others may clear them up."

Dr. H. P. WALCOTT of Massachusetts read a paper prepared by Dr. JAMES CRANE, Health Commissioner of Brooklyn, N.Y., on the "Prevention of Certain Contagious Diseases by Local Boards of Health."

Dr. ELISHA HARRIS of New York offered resolutions in commendation of the local "Sanitary Association of the City of Lynn," which were referred to the Executive Committee without debate.

Adjourned to seven and a half P.M.

EVENING SESSION.

Addresses of welcome were delivered by his Excellency, Louis A. Wiltz, Governor of Louisiana, Hon. J. W. Patton, Mayor of New Orleans, and Dr. J. P. Davidson, President of the Louisiana State Medical Society.

The President then delivered the annual address, after which the Association adjourned to Wednesday morning at ten o'clock.

WEDNESDAY, DEC. 8.

The Association met at ten A.M., the President, Dr. BILLINGS, in the chair.

Prayer was offered by the Rev. Dr. PALMER of New Orleans.

The Executive Committee recommended a large number of gentlemen and one lady for membership. The persons named were unanimously elected members of the American Public Health Association.

Dr. SALOMON of the local committee read the following communications: —

NEW ORLEANS, SPANISH FORT, AND LAKE RAILROAD COMPANY,
NEW ORLEANS, Dec. 6, 1880.

To the Delegates of the American Public Health Association.

GENTLEMEN, — I beg to extend to you an invitation to visit the Spanish Fort, and for that purpose hereby tender the use of our cars for any day that you may designate.

Trusting that you will honor us with your presence at an early date, I have the honor to remain,

Very respectfully yours,
M. SCHWARTZ, *President.*

ORLEANS CLUB, 148 CANAL STREET, NEW ORLEANS,
Dec. 7, 1880.

To the Secretary of the American Public Health Association.

DEAR SIR, — The visiting members of the American Health Association are cordially invited to the rooms of the Orleans Club during their sojourn in this city.

The club is open at all times from eight A.M. to twelve at night. Lunch daily, from eleven A.M. to two P.M.

With respect, your obedient servant,
D. WARREN BRICKELL, M.D., *President.*

It was moved and seconded that the invitations and courtesies be accepted with thanks, and the motion was carried.

The President announced that the Sanitary Council of the Mississippi Valley would meet at nine o'clock, in Grunewald Hall, on Thursday morning.

The Executive Committee recommended that the following resolutions be rejected : —

Resolved, That all nominations of officers of this Association shall, before being submitted to ballot, have the indorsement or approval of a majority of the members present from the State in which the candidate resides.

Resolved, That the order of business be so amended that all new business, all motions and resolutions referring to public health, be introduced upon the second day of the session of this Association, and upon no other, and that the discussion of all business so introduced shall take precedence of all other business upon the demand of any member.

Resolved, That a standing committee on general sanitation, composed of one member from every State and Territory represented in the Association, be annually appointed by the Executive Committee, each member of which shall be required to make an annual report to the Association of the sanitary condition and requirements of his State or Territory, the prevalent diseases, and other matters of interest to the Association.

The Executive Committee reported for adoption the following resolutions : —

Resolved, That the standing rule adopted at the last meeting, for the creation of an Advisory Committee, be continued; that it shall be hereafter known as the Advisory Council, to consist of one member from each State, one each from the army, navy, and marine hospital service, the commissioners of education; and that, in addition to the duties heretofore performed by the Advisory Committee, it shall act as a nominating committee for this Association.

Adopted.

Resolved, That the members of the Advisory Committee present shall constitute a nominating committee for the nomination of officers for the next year, to report to-morrow (Thursday) morning in the business hour.

Adopted.

The Executive Committee reported back the following resolution without recommendation : —

Resolved, That the Executive Committee be instructed to communicate with the State and municipal boards of health throughout the country, and supply them with a copy of the Report of the Committee on Prevention of Venereal Diseases, and request their co-operation in the attainment of the object of the resolution submitted and adopted by the Association.

Discussion.

Rev. F. H. WINES of Illinois. — "Mr. President and gentlemen of the Association, the distinguished character of the gentleman who read the report on the regulation of prostitution, and the prevention of venereal diseases, yesterday, and the distinguished character of the audience which I have to address, make me feel a great hesitancy in coming before you to speak upon a subject of such delicacy. I have never had imposed upon me a duty from which I have so shrunk, and largely because I deprecate any public discussion of the subject. However important it may be, and whatever good may come out of it in the end, it seems to me inevitable that more or less harm must result from the ministration which such discussion affords to a certain prurient feeling in the community, especially on the part of young people.

"If this were a medical question simply, I should not dare to say a word. But it is not. It is a question of jurisprudence, a question of morals, a question of the organization of society, of social philosophy, as well as of sanitary reform. I desire for a moment to call the attention of the Association to the complicated nature of the problems involved in its solution, because these other aspects of the subject appear to have been very largely overlooked in the report presented by the committee.

"I do not understand this report avowedly or consciously to favor the introduction of the system of licensing prostitution in the United States, although perhaps it may be so understood. But it certainly does contemplate police surveillance of prostitution. It certainly does contemplate the creation of a host of officers ; for the language used in the report is, 'The plan proposed by your committee implies the appointment of sanitary officers in every hamlet, village, town, and city of the country, subordinated to and controlled by county, municipal, or State boards of health, and empowered to investigate and discover every preventable cause or form of disease, syphilis included.' It certainly contemplates the expenditure of large sums of money from the public treasury ; for the report goes on to say, 'They (the committee) further recommend the establishment of special or lock hospitals for the gratuitous treatment of all venereal affections, and, in the absence of such hospitals, provision for their treatment without charge, and without unnecessary exposure

of their victims, by health officials under whose cognizance they may come.' It certainly contemplates the exercise of new powers by State and municipal boards of health; for the resolution adopted by the Association yesterday is in the following words: —

"'*Resolved*, That the American Public Health Association earnestly recommends the municipal and State boards of health to urge upon the legislative bodies of this country the enactment of a law constituting it a criminal offence to knowingly communicate, directly or indirectly, or to be instrumental in communicating, a contagious disease, such as small-pox, scarlet fever, or the venereal diseases, and giving to the said boards of health, and to the State and municipal health officials under their control, the same power in the prevention, detection, suppression, and gratuitous treatment of venereal affections which they now possess in the case of small-pox or other contagious diseases.'

"Now, gentlemen, I submit to you that these propositions, taken together, constitute a question altogether too large for decision — certainly for a hasty decision — by an association devoted exclusively to sanitary reform. While it is eminently proper that this Association should emphasize its sense of the terrible evil to be fought, and that it should call the attention of legislatures, if necessary, to the importance of some action — wise and prudent action — on the subject, it appears to me that the Association is not prepared at this time to recommend any specific legislation. The legislation suggested in the resolution is of too vague a character to be practical. Any recommendation which the Association may see fit to make should take the form of a project of a law. But the committee has not submitted to us any project of a law. Neither is it certain that the Association could frame a sound and satisfactory project of a law without aid from our brethren of the legal profession.

"It appears to me, therefore, that the adoption of this resolution is premature; that the report of the committee is crude; and that the action proposed involves consequences which are very much more far-reaching than gentlemen of this Association at the present moment apprehend. It involves changes in our police system. It involves changes in our laws, especially in the laws relating to the jurisprudence of crime. It involves the appointment of new officers. It involves the raising of money by taxation for special purposes connected with the enforcement of the new statutes to be adopted. It involves the re-organization, to a great extent, of the whole machinery of government, in so far as government takes cognizance of, or recognizes, this great evil, about which, regarded as an evil, the committee has not said one word too much. Possibly too much stress has been laid upon some of the forms in which the contagion might be communicated under circumstances peculiarly favorable, and not likely often to occur. But we are all agreed that the venereal disease is a great evil, and that every thing which can be done to prevent its ravages ought to be done. That is not the question before the Association. The question before us is, whether we are prepared to say what shall be done, and whether the action suggested by the committee meets the emergency.

"For one, I have no superstitious confidence in legislation as a remedy for any evil; and the legislation suggested is certainly very indefinite. First, it is proposed to make the communication of the syphilitic virus a criminal offence; and, second, to give to boards of health the same powers in the prevention, detection, suppression, and gratuitous treatment of venereal affections, which they now possess in the case of small-pox or other contagious diseases. I submit to you that this is legislating in the dark; that you are recommending to legislatures you know not what. You create a new crime; but you do not say how it is to be proved, nor what is the penalty to be inflicted. You confer additional powers upon boards of health, but you do not define these powers.

"I shall not enter into any discussion of the question of the regulation of prostitution, nor attempt to show the insuperable nature of the difficulties to be confronted in any attempt to regulate it, for the reason that regulation is not advocated in the report, at least not openly, although I do think that the resolution adopted yesterday contains in itself the germ of such a system. I think that, under that resolution, some boards of health might undertake to prescribe regulations which would be tantamount to a modified license system and a modified registration of prostitutes. But I call attention to the fact that laws do not enforce themselves. They depend on public opinion for their enforcement. Is there any public opinion in this country which would sustain such legislation as this? Is not the whole drift of public opinion in the United States in opposition to it? Laws do not enforce themselves. They must be administered by the executive department of the government: they must be enforced by the constabulary. Will you trust the police of our large cities to carry out an order such as this in the interest of good government and of public morals? The gentleman who wrote this report is worthy of our highest confidence and respect. We cannot question his earnestness and enthusiasm in this matter. He tells us that we are going too slow. But I say we must go slow, we must pause and consider the effect of our action and our counsel, before committing ourselves on a question of so grave importance.

"If this Association should make a mistake on this subject, — if it should place itself before the public in the attitude of recommending the licensing of prostitution and the registration of prostitutes, — I question very much whether the influence of the American Public Health Association for good in other directions would not be seriously impaired. If it should undertake a task of this sort, and fail in the attempt, it certainly would not cover itself with credit.

"I believe — and I say it with all possible delicacy — that the sexual passion in man is one form of force; and that, though a variable quantity, it is, nevertheless, like all force, capable of expression, as respects its amount, in mathematical terms, if we had a measure for it and a mathematical formula at our command suited to the necessities of the case. I believe that this sexual passion finds vent in one or the other of two directions, — either under the

seal of marriage or outside of the seal of marriage; and that, in proportion as it spends itself in one direction, it is exhausted and not available in the other. I believe, therefore, that prostitution and marriage are antagonistic to each other. I believe that, just in proportion as prostitution is increased, marriage diminishes; and, just in proportion as marriage is held sacred, prostitution is diminished. This is the central point of the discussion, and I want to bring my thought out clearly.

"In the State of Illinois we have a system of licenses for marriages. All proposed marriages in each county are recorded in the office of the county clerk. I once examined this record for the county in which I live. I counted the number of licenses granted each year for a term of years past, and compared the number each year with the population of the county as ascertained or computed from the United States census. I found this startling result, that where, twenty years ago, there were four licenses granted in proportion to the population, twenty years later there were only three. This is equivalent to saying that marriages have diminished in number twenty-five per cent in twenty years. One-fourth of the young men, who, in a primitive and simpler state of society, would have married, do not now marry. While the marriage relation has thus fallen into disuse, on the other hand prostitution has increased. I believe that this is the expression of a general law: namely, that whatever encourages and promotes prostitution is a blow at marriage; but whatever defends marriage, sanctifies and hallows it, is a blow at licentiousness.

"Do you not think that the interest of public morals and the welfare of society require of us rather that we should defend the marriage relation against the attack made on it, than fight venereal diseases by new and untried methods? That such an attack is going on in the world at large, there can be no question. Some of the forms in which it disguises itself are insidious. In those countries where prostitution is regulated, there the lowest ideas with regard to the marriage relation prevail. In France, for instance, it is a maxim of the French law that no inquiry is to be made as to a child's paternity. The difference between the continental practice and our own indicates the difference in our social organization and usages. There is, I know, a great want of unanimity, on the part of distinguished and competent observers, as to the practical result of a system of registration and inspection in those countries where such a system exists.

"I will not detain the Association further. I trust that the Association will not commit itself upon this subject at this meeting, but that, if action must be now had, it will confine itself to the appointment of a committee to prepare a project of a law, and to consult with eminent jurists throughout the country as to the possibility and practicability of the legislation suggested. In any case, the Association ought not to take up and settle a subject like this, from a purely medical and sanitary point of view, without reference to other aspects of the question; but it should be thoroughly discussed in its moral and social bearings before final action is taken."

Dr. A. L. Gihon, U.S.N. — "The very object of this resolution is to defend

the sanctity of the marriage-bed. As a father, I would infinitely prefer my daughter to live and die unmarried and pure, than wed a young man of a community in which one in every five, ten, or fifteen is affected with syphilis. The object of this resolution is to blot out syphilis so that young men may marry young women and not disease them. It is in the interest of the bride that I brought this resolution before the Association: it is to protect her purity. And I call upon every medical man to say how many instances they have known of young men who had better never have been married."

Dr. A. N. Bell of New York. — "It will not be necessary for me to say to those who know me, that I have the highest respect for morality and for religion: but it startles me to hear a person get up here and say to us, 'Encourage syphilis in order to elevate the honor of woman;' for that is literally the logic of his argument. And he absolutely cites figures to show that in the progress of syphilis the number of marriages are lessened. He says he does not regard this Association as a proper body to dispose of this question; and he therefore advises us to put off the matter a little longer, and that we should consult authors in law and morals as well as medicine. He does not consider that the committee which has had this in charge has covered all these points. He takes it for granted, that, when committees are appointed to carry out a particular purpose, they, of all other men, neglect to get proper information on the question. Can any one, who has watched the progress of this committee for the last four years, charge it with such neglect? Can any one, who has had any opportunity whatever of watching the progress of this disease, not only in our own country but throughout the world, say that it needs more time to bring the facts before the people? Can any one say it is an expensive step to take, when the marine-hospital service and army and navy services, not only in this country but throughout the world, are spending millions on account of this disease, and not one dollar for its prevention? Is this the way for sanitarians to act? Are we always to deal with results, and not causes? This Association was organized for the special purpose of preventing disease, not to do any thing to encourage it: that is death. Is it not a maxim here as elsewhere among sanitarians, that preventable mortality is criminal mortality? This committee does not ask that women be examined alone, but that men shall be examined, and shall be held responsible for their offences. So far as licenses are concerned, the committee does not ask for that. They ask health authorities, they ask the men whose business it is to look after the diseases, they ask the men who are most familiar with the causes of disease, — they ask them to go before the legislatures and request to have put upon them the same authority for the control of this worse curse than small-pox, which kills ten to one, which carries impurities into almost every household, as they have for the control of other contagious diseases. It is not quite as bad here as in the land of China; but we should not continue to encourage it until it is so."

Dr. Azel Ames, Jr., of Boston. — "I hardly know whether I am most embarrassed by the distinguished character of the gentleman from Illinois, who has for years given such close attention to social problems; or by the fact that

this Association has already acted on this proposition, and no motion has been made to rescind the action of the Association; or by the statement of the gentleman himself, that he is in favor of every thing that shall do away with the further extension of venereal diseases in this country. Certainly, as I understand it, the report of the committee aims at nothing more; and the gentleman, I cannot help thinking, begs the question, when he says that that is not the main issue, but whether we shall license prostitution. I do not so understand the report: if I did, I should not occupy this platform. It seems to me, if we cannot fully accomplish a thing, we may at least help it. As the President of the Association said last night in his address, 'we do not know much, but we know a little; and we know so much, it is encouraging to believe that we may know more.' I do not believe we shall endeavor too much; I do not believe we shall learn too much; and it is because I so think, that I stand here to say that I cannot, for the life of me, see any harm in making the inquiry. I have myself given some little attention to this matter of prostitution; and certainly the result is far from bringing me to the conclusion that it is desirable to license it: quite the contrary. I cannot, however, for a moment come to the conclusion of Mr. Wines, that this subject is too large; that the question is too great for us to deal with, because it is a social question. I am sure that his presence on this platform, taking part in this discussion here, is proof positive by itself of the close connection between this question in its social and its sanitary aspects.

"I do not fear that, in sending out this message of inquiry to these State boards of health, we are going to do damage, either to our finer feelings, the morals of the community, the sanctity of marriage, or to the best interests this society seeks to subserve; and I refuse to believe it, from the fact, as stated by Dr. Bell, that it aims at a better care of *men*, at holding them to a larger responsibility, getting away from the old barbaric tendency out of which we are trying to grow, wherein woman was looked upon as a lower order of being, made only to subserve the behests of man, he being in no way responsible to her. I believe the duty is imposed upon us to see that our brothers are virtuous, as much as to watch over our sisters; and it seems to me that we make no mistake in seeking for the truth.

"My friend from Illinois has stated that no law is offered; but he himself has answered in the next sentence that criticism, when he says it would be impossible to draught a law of uniform application.

"My experience is, that each locality, each State, each municipality, by its ordinances, must frame for itself, enact, and put in force for itself, such ordinances as its own condition and its own advancement in the recognition of the matter most require.

"I believe it is proper to make the subject a matter of conference between this Association and the State boards of health, as to what shall be done.

"I have no fears that in the honestly worded language of this committee there lies a hidden purpose to thrust upon us the matter of licensing prostitution. I know the gentleman who has introduced the subject here too well to

believe it, and I do not believe it is desirable to rescind the action taken yesterday. I hope the report will go to the Board of Health."

Mr. F. H. Wines, Springfield, Ill. — "Will the gentleman allow me a question? I find in the report of the committee the following words: 'Your committee recommend the enactment by the legislatures of the several States of a law . . . . empowering and requiring health officials to establish such regulations as may be necessary for the prevention, discovery, treatment, and suppression of such diseases.'

"Now, suppose the health officials of Boston, New York, Chicago, or New Orleans, should conclude that the regulations which are necessary are the registration of prostitutes, and the toleration of houses of prostitution, without interference, and the abolition of all laws on the statute-books which make prostitution an offence; suppose that they should determine that such regulations were necessary for the discovery and suppression of such diseases, — whether the gentlemen of the committee intend it or not, does not the Association, when it adopts their report, recommend and empower health officials to establish a system of licenses and registration whenever they consider it necessary? The language is so vague that we do not know what we are recommending."

Dr. Azel Ames, Jr., of Boston. — "I would say this: while I can conceive it is possible that that should be a logical possible conclusion of the recommendation of this committee, I do not believe for a moment either the gentleman himself, or any other person, believes that this Association has done with the question when it simply makes this recommendation. I look upon it as an inquiry, and an ascertaining of data for further consideration; and I trust too much to the wisdom of those interested to believe that they will rush at once to any extreme measures. I trust too much to the feeling of sanctity of marriage that obtains in communities everywhere, to believe any such dogma will follow, as suggested by Mr. Wines, before this matter is carefully gone into, on the recommendation of this committee. I do not conjure up any such fears as those suggested by the gentleman from Illinois. I believe such action remote, — almost, in the nature of things, impossible."

Dr. E. M. Hunt of New Jersey. — "I was quite satisfied to leave the matter where we left it yesterday. I knew whereof I spoke; and it was not with any fear as to the impression it might make on the moral sentiment of the country that I was prompted to make the remarks I did, but in the interest of the Association.

"Now, the very point that was struck out in the resolution yesterday appears in this one to-day; and it is to that I object. We seemed by common agreement to have left it out, and now it is brought up in this form. I object to State boards of health being enjoined by an Association like this in this crude, indefinite way. I object to this resolution, and this whole report, from beginning to end, which not only speaks of this subject, but also of others not relating to the question the committee was asked to report upon, being sent down to the different boards of health recommending them to lay the matter

before the legislatures of their several States. It has happened that I have not yet met a single member of a State board of health who intends to do any such thing. I have had conversations with several who have said, "We agree with you entirely: we wish this Association would not, in this crude way, seem to enjoin State boards of health to take action in this matter." I am not willing that the State Board of Health of New Jersey should have sent down to it this whole paper as the expression of the Association. It is really a discussion of the whole matter, and contains many points, many ideas, which are not in the mere resolution offered; and I ask, therefore, that this Association let the matter drop where it is, and that, as we yesterday consented to that part of the resolution relative to State and municipal boards of health, we consent to it to-day."

Dr. A. N. Bell of New York. — "I am for one sincerely glad that that which was dropped out of the resolution yesterday has been brought up again in this form. The resolution was altered, emasculated yesterday; but it is here restored. With all due deference to Dr. Hunt's acquaintances and his intercourse with the officers of the State boards of health, I am satisfied, from my own stand-point, that there are nevertheless many of them who only wish the opportunity to make their efforts forcible before the legislatures, — only an opportunity to act with authority and responsibility. All the committee asks is, that the subject be brought before the legislatures of the several States by the State and municipal boards of health, otherwise not only the four years' study given the question by the committee will be lost, but the many times four years' experience which they have had."

Dr. C. W. Chamberlain of Connecticut. — "I simply come before you, gentlemen, to second the views of Dr. Hunt of New Jersey, as a representative of the State Board of Health of Connecticut, and a representative also to a great extent of the public sentiment of the State on this question. Similar legislation came before the Legislature at the last session; and I know, that if we were required officially, if we were obliged to take any action, that it would be to the detriment of sanitary science and its advance in that State. I am not prepared to discuss the question fully, but I know that I represent the sentiment of Connecticut on this question."

Professor W. H. Brewer of Connecticut. — "As a member of the same State Board of Health as Dr. Chamberlain, I have only to confirm what he says."

The President then put the question on the passage of the resolution, which was adopted by a vote of ninety-three yeas to twenty-eight nays.

The following resolutions were then offered by Dr. J. N. McCormack of Kentucky: —

Resolved, That a committee of five be appointed by the President to take under consideration the advisability of establishing a national museum of hygiene, the said committee to report at the next annual meeting of the Association.

Referred to the Executive Committee without debate.

By Dr. C. W. Chancellor of Maryland: —

Resolved by the American Public Health Association of America, That, for the better protection of the public health, the legislatures of the several States be and they are hereby invoked to enact measures imposing a severe penalty against any person who, while suffering from any dangerous, contagious, or infectious disorder, wilfully exposes himself without proper precautions against spreading the said disorder in any street, shop, public place, or public conveyance, or who enters any public conveyance, without previously notifying the owner, conductor, or driver thereof, that he is so suffering; or any person who, being in charge of any one so suffering, shall wilfully and knowingly expose such sufferer; or any parent or guardian who shall wilfully and knowingly permit their child or children to attend any public school during the existence of such disease in the family; or any person who gives, lends, sells, transmits, or exposes without previous and thorough disinfection any bedding, clothing, rags, or other things which have been exposed to infection from any such disorder; or any owner or driver of a public conveyance who shall not have immediately provided for the disinfection of such conveyance after it has, to his knowledge, conveyed any person suffering from a dangerous, contagious, or infectious disorder, or the body of any person who has died from such disease; or the owner of any house in which any person has been recently suffering from a contagious or infectious disease, knowingly lets it or any part of it without having previously disinfected it, and articles therein liable to retain infection, to the satisfaction of the constituted health authorities, where such authorities exist, or, in the absence of any such authorities, to the satisfaction, stated under certificate, of a legally qualified medical man; or any person who, showing for sale or rent any house or part of a house, shall make a false statement as to the existence of any contagious or infectious disease therein at the time or within the period of two months prior thereto.

Resolved, That the Executive Committee of the National Board of Health be requested to have prepared a project of a law embodying the substance of the foregoing resolution, and that the President of this Association be directed to transmit the same, together with a certified copy of the resolution, to the governors of the several States, with an official request that they will, as soon as practicable, lay the matter in due form before the legislatures of their respective States.

The resolutions were received, and referred to the Executive Committee.

Major W. T. Walthall of Mobile called attention to the following resolution offered by him at the Richmond meeting, and which had received no action of the Association: —

Resolved, That a committee of five members be appointed to prepare and recommend measures for the more efficient management and control of future epidemics, especially for the training, selection, and employment of skilful and trustworthy nurses.

Adopted.

The President read the "Report of the Advisory Committee on National Sanitary Legislation." (See Reports of Committees.)

The report was adopted.

Dr. G. B. Thornton of Memphis then read a paper entitled "The Sanitation of Memphis."

The President introduced Gov. Porter of Memphis.

Discussion.

Dr. D. T. PORTER of Tennessee. — "I recognize a great many faces I saw at Nashville in this Association. While there I noticed the interest you all felt for our city: I felt grateful to you for it. We had a great deal of advice given us, and many suggestions; and we consulted everybody who seemed to know any thing about any means by which we could remedy our situation. You will remember that the Hon. J. W. Clapp appeared before you in behalf of Memphis; that he was not there as a mendicant with his hat in his hand: but he wished to be told what to do, and it would be done. I will state that we have endeavored to carry out that promise. We have cleaned the place up: we have closed up over three thousand privy vaults from five to sixty feet deep. We have built twenty-five miles of sewers; and they are in perfect operation and giving satisfaction, and I do not see any reason why they should not continue to do so. We have also constructed the same number of miles of subsoil drains. They are acting admirably. We have constructed over five miles of stone pavements, and taken up a good deal of Nicholson pavement. We have done a great deal of other sanitary work, and hope to make Memphis the cleanest and healthiest city on the continent; and I see no reason why we should not do it."

Col. GEORGE E. WARING of Rhode Island. — "Mr. President and gentlemen, the work of laying sewers in the city of Memphis has been described so often and in so many places, that it seems, from my point of view, hardly worth while to say any thing more on the subject. There may be, however, some here who do not know precisely what the system there adopted has been; and I would say, that in all its details it is described quite at length in a paper which I read a year ago at Nashville, and which since has been published in the fifth volume of the Transactions of this Association. I will therefore confine myself to a very brief description of the manner in which the work has been done, after which I will be glad to answer any question that shall be asked as to details which I do not make clear." [Col. Waring then described the manner of doing the work, according to a diagram, copies of which were distributed among the members of the Association.]

Dr. D. T. PORTER, governor of the Taxing District of Shelby County, Tenn., said, "There is no man in the United States to whom we are more indebted than to Dr. Billings. I met him in 1879 at McKenzie: he remarked to me, that, if I desired it, he would come down and make a sanitary survey of Memphis. In November, or latter part of October, I gave him an official invitation; and, as a great many will recollect, he came from Nashville with a number of your members, and made this sanitary survey. We had sanitarians and engineers. Dr. Ames, I recollect, was there, and Dr. Folsom of Boston. After making the survey, he made his recommendations, and I will say that they have been almost entirely carried out; and it is to him and to the National Board of Health we are indebted for the information that has put us on the right road to clean up our city."

Dr. A. N. Bell read the paper of Mr. Robert Moore, sewer commissioner of St. Louis, entitled "Storm-Water and House-Drainage in Sewers."

Discussion.

Col. George E. Waring, Jr., of Rhode Island. — "Mr. President and gentlemen, it seems to me that any criticism I might have to make concerning Col. Moore's paper is fully done in what I said yesterday on the same subject. Practically Mr. Moore concedes, that, in a large majority of cases (for those are a very large majority of cases which have not the Mississippi, Ohio, or Missouri River to discharge into), it is necessary that storm-water should be kept from the house-drainage. So far as I have been able to gather from listening to Mr. Moore's paper, he expresses in another way precisely what I said yesterday on the same subject.

"He says, whenever the site of a town or city comes to be much crowded, open channels for water are an obstruction to business, and must be covered up; and he instances Fleet River, London. Of course, all will admit that. The only point I made is, that the storm-water shall not be taken into underground sewers until it becomes necessary to do so. Because Fleet Sewer is an outlet for an enormous water-shed, it becomes necessary to cover it up. All that we claim is, that, in so far as the surface-water can be allowed to run through street-gutters without absolute annoyance, without danger to property, without interfering with the traffic of streets, it should be allowed to run that way, not only because it is the cheapest, but the best manner in which to dispose of it. Perhaps the most striking instance in support of what I say is the city of Baltimore. I was called there last autumn by persons interested in introducing a system of sewers there, and I was told the chief objection to be encountered was this: that, while it was admitted that there would be an advantage in getting rid of the privy vaults, no system would be submitted to which would take away the cleansing of the streets by the rainfall. When I first knew Baltimore, there were no sewers at all, and during the heavy rains there was a flooding of the lower parts of the city; and now it is necessary in many places to cross the streets on high stepping-stones when the sewers are up. I believe Baltimore's example is a good one. If they sewer their city, it should be done by the separate system.

"The question of cost is, of course, an important one, because the cost of any sanitary work must have great influence on its adoption; but it seems to me that is, after all, the smallest consideration in connection with the decision of this question as to whether we shall have the separate or the double system.

"Concerning the cleanliness of the sewers of St. Louis, I have no doubt, in those built under Mr. Moore's direction, it would be difficult to find any thing like what we should call a deposit of foul matters; but I do believe, I feel very sure, we should find a certain adhesion of offensive matters to the brick walls of those sewers. I know we should find an odor, which, while not necessarily fatal to those who may work there, is certainly very disagreeable, and unfit to be admitted to the occupied rooms of houses.

"Mr. Moore instances the city of Croydon, Eng., where they have a separate system of sewers, and where the sanitary authorities pronounce the small sewers more dangerous than the larger ones.

"Croydon is not a case in point. There is no case in point except the city of Memphis. The separate system has been partly introduced at different places by simply putting in small pipes adequate to the removal of the house-drainage, but with no means of flushing or ventilation. It is only when the plan is carried out to the extent it has been at Memphis that you can make a comparison between the two systems.

"Nearly all who criticise the separate system speak of its complexity, — the necessity for double pipes. But we do not propose there shall be any thing like a system of storm-sewers.

"The question has been asked me whether I will explain how far, in my opinion, the system of Memphis is applicable to New Orleans. The President notifies me it is near the time for adjournment, and I shall have to make a short answer to this question. I believe the system, in its general features, is perfectly applicable to New Orleans. But of course the conditions here are different from what they are in Memphis. In Memphis we have steep inclinations: here we have not. An artificial grade would have to be established in absence of a natural one. I believe if a large sewer were laid in Rampart Street, for distance of half a mile up town, connected at its lower end with pumping machinery of sufficient power to remove every thing, we should have practically the effect that would be produced where there is a low, natural outlet. Sewers from all parts of the city could be led with sufficient fall into this sewer. The flushing-tanks would have to be made larger. But, with modifications which are only modifications of detail, I think the system is applicable here" (New Orleans).

Adjourned to three o'clock P.M. Recess.

AFTERNOON SESSION.

Dr. GUSTAVUS DEVRON of New Orleans, La., read a paper prepared by Col. J. M. Keating of Memphis, Tenn., on "The Value of Sanitation from an Economical Stand-Point."

EDWARD FENNER, Esq., Vice-President of the New Orleans Auxiliary Sanitary Association, read a paper prepared by Professor John Gamgee of Washington, D.C., on "The Sanitary Urgency of the Florida Ship-Canal."

Dr. A. L. GIHON, U.S.N., read a paper prepared by Dr. T. J. Turner, U.S.N., Secretary of the National Board of Health, on "The Hygiene of Emigrant Ships."

Dr. D. C. HOLLIDAY of New Orleans read a paper on "Dengue."

Dr. J. G. THOMAS of Savannah, Ga., read a paper on "The History of Dengue."

Papers upon dengue by Dr. F. P. Porcher and H. B. Horlbeck of Charleston, S.C., were read by title, and referred to the Publication Committee.

The Association then adjourned to seven and a half P.M.

EVENING SESSION.

Dr. EZRA M. HUNT of New Jersey read a paper entitled "Our Present and our Needed Knowledge of Epidemics."

Hon. JOHN EATON, United States Commissioner of Education, delivered an address on "Sanitation and Education."

Dr. ELISHA HARRIS of New York presented an abstract of a paper entitled "A Medical View of Domestic Pestilences, with Reference to the Sanitary Warfare against them."

Dr. MOSES T. RUNNELLS of Indianapolis, Ind., was allowed ten minutes for general discussion.

The Association then adjourned to ten o'clock Thursday morning.

THURSDAY, DEC. 9.

The proceedings were opened with prayer by Rev. Father HUBERT of New Orleans.

The Executive Committee recommended that the applications of about one hundred new members be accepted, and they were elected.

Dr. SALOMON, of the local board, read an invitation from the New Louisiana Jockey Club, extending to members of the American Public Health Association the free use of their grounds.

A resolution of thanks was tendered to the various city railroad companies for courtesies; also to Hon. H. P. Kernochan for an invitation to visit his plantation.

Invitations were received from Memphis, Washington, Evansville, and Savannah, Ga., for the American Public Health Association to meet in their respective cities. The Advisory Committee recommended that Savannah be selected for the annual assembling of this convention in November next. The recommendation of the Advisory Committee was adopted.

The following resolutions were introduced, and referred to the Executive Committee without debate: —

By Dr. J. N. MCCORMACK of Kentucky, —

Resolved, That for the purpose of securing uniformity in legislation in the States of this Union for the prevention of venereal diseases, the Committee for the Prevention of Venereal Diseases be instructed to furnish such a project of a law to the various State boards of health as in their judgment will best secure the direct results.

By Dr. D. W. HAND of Minnesota, —

Resolved, That, in view of the fact that diphtheria, a disease more frequent than typhoid fever, more contagious than small-pox, and more fatal than yellow fever, now prevails over nearly the whole of this country, it is the duty of this Association to indicate some way of preventing its spread.

Resolved, That the contagiousness of diphtheria is now well established; that disease should, in all cases, be treated with the same vigorous isolation and quarantine that is everywhere enforced against small-pox.

Resolved, That, as we know little or nothing of the origin of diphtheria, we will request the National Board of Health to investigate the causes of this disease with the same thoroughness it is exercising in the case of yellow fever.

By Dr. James H. Letcher of Kentucky, —

Whereas, There are annually occurring in our large centres of population, and frequently in the provincial districts, numbers of cases of sickness and death from small-pox; and,

Whereas, The only certain method of restricting and preventing this loathsome disease is by vaccination and re-vaccination; therefore, be it

Resolved, That the American Public Health Association appoint a committee of five members, whose duty it shall be to take steps looking towards the enactment of a national law upon the important subject of compulsory vaccination.

Resolved, That the boards of health of the several States in the Union, or, where no State boards of health exist, the State medical societies, be requested, through this committee, to take the matter under immediate advisement, and attempt to secure, if deemed best, the enactment of such laws in their respective States.

Resolved, That, pending the question of compulsory vaccination, the several boards of health or State medical societies direct the attention of all local boards of health to the importance of seeing that all persons in their respective districts not previously vaccinated be so.

The Executive Committee reported back the following resolutions, introduced by Dr. Elisha Harris of New York on Tuesday, with the recommendation that they be adopted: —

Resolved, That, in the judgment of the American Public Health Association, the example of the local sanitary association of the city of Lynn, Mass., as presented in this meeting by Dr. Pinkham of that city, and as known by the works and publications, commends itself for imitation in all cities and villages.

Resolved, That, in view of the great practical importance of local sanitary associations in cities and villages, the American Public Health Association earnestly recommends that a well-organized local association to promote the interests of hygiene — domestic, personal, and public — should be maintained in all populous communities; and, further, that such local organizations should be effectual promoters of sanitary knowledge and improvement, and the faithful support of local sanitary authorities.

And the resolutions were adopted.

The Executive Committee offered the following as a substitute for the resolution submitted by Dr. McCormack on Wednesday, which, on motion, was adopted: —

Resolved, That the Executive and Advisory Committees be requested to take under consideration the advisability of establishing a national museum of hygiene, and to report at the next annual meeting of the Association.

The Executive Committee recommended that the resolutions submitted by Dr. Chancellor lie on the table, to come up for action after the reading of papers on the suppression of contagious diseases.

Recommendation adopted.

The Advisory Council offered the following: —

REPORT OF THE ADVISORY COUNCIL ACTING AS NOMINATING COMMITTEE OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

New Orleans, La., Dec. 8, 1880.

Mr. President, — I have the honor to report in behalf of the Advisory Council of this Association, charged by its order with the duties of a nominating committee and of reporting at this hour, that the Council having assembled, — there being present sixteen members, the honorable Commissioner of Education and representatives of the States of Alabama, Illinois, Louisiana, Maryland, Massachusetts, Rhode Island, Michigan, West Virginia, New York, North Carolina, Connecticut, Wisconsin, Iowa, Kentucky, and of the United States Navy, — and having organized by the choice of Hon. John Eaton, Commissioner of Education, as chairman, and Dr. John H. Rauch of Illinois as secretary, unanimously agreed upon and now present the following list of nominees for the several offices of the Association for the ensuing year: —

For President. — Dr. Charles B. White of New Orleans, La.

For First Vice-President. — Professor R. C. Kedzie of Lansing, Mich.

For Second Vice-President. — Professor Henry F. Campbell of Augusta, Ga.

For Secretary. — Dr. Azel Ames, jr., of Wakefield, Mass. (*for three years*).

For Treasurer. — Dr. J. Berrien Lindsley of Nashville, Tenn.

For Members of the Executive Committee. — Dr. D. C. Holliday of New Orleans, La.; Dr. E. M. Hunt of Metuchen, N.J.; Dr. George M. Sternberg of the United States Army; Dr. E. L. Griffin of Fond du Lac, Wis.; Dr. J. G. Thomas of Savannah, Ga.; Dr. Thomas F. Wood of Wilmington, N.C.

Respectfully submitted.

John H. Rauch, *Secretary.*

The report was accepted and adopted, and the Secretary directed to cast a ballot for the Association for each of the officers nominated.

The committee appointed to examine the report and books of the Treasurer, reported that it found the same correct in every respect.

Dr. Henry B. Baker of Lansing, Mich., read a paper on "The Relations of Schools to Diphtheria and Similar Diseases."

Dr. O. W. Wight of Milwaukee, Wis., read a paper on the "Management of Contagious Diseases in Milwaukee."

Dr. T. S. Scales of Mobile, Ala., read a paper on "Municipal Sanitation as practised in Mobile for preventing the Spread of Yellow Fever."

Dr. J. M. Hall of the Chicago Health Department read a paper prepared by Dr. O. C. DeWolf, Health Commissioner of Chicago, Ill., on "The Results of attempting to check the Spread of Small-pox at Chicago."

Dr. D. C. Holliday presented the report of the New Orleans Medical and Surgical Association on propositions submitted by the Executive Committee. (See Reports of Committees.)

Dr. A. N. Bell of New York read a paper on "The Relations of Certain Filth Diseases to Cold Weather."

Discussion.

Dr. J. P. Dake of Tennessee. — "We have heard some papers this morning relating to the administration of boards of health, very interesting papers, which are well deserving of notice. In the same line I desire to say a few words upon a very important feature of the subject; viz., the constitution of boards of health. I submit this proposition, that boards of health should be representatives of the leading interests of the communities served. Whether it be the State or the city board of health, it should have within itself representatives of the different interests to be protected and to be benefited by the administration health authorities. In the first place, then, every board of health should have within itself lay representation. This should be the case especially with State boards of health. The physician and medical man upon the State board of health views the field from the medical stand-point. Educated with regard to disease, its habits, modes of spreading, and the means of prevention, it may be that he will be too rapid in the administration of those measures which seem to him from his stand-point to be called for. And it may be, that, in his zeal to put in practice his opinions, that he would override the rights of the business community which he aims to serve. Hence, I say, there should be a lay representative upon every State board of health.

"In the State of Tennessee, from which I come, we had a good board of health, made up entirely of medical men. We had no especial fault to find with the members of the board and their administration of affairs; but our experience with yellow fever, with the efforts to prevent its spread, with measures adopted by citizens, business men, the merchants, we found that it would be better, more satisfactory, to have on that board lay representation: and I had the pleasure myself of sketching an amendment to the law constituting that board, providing that there should be one representative of the transportation interests of the State on the board, and one representative of the mercantile interest or commercial interest of the State. The amendment was adopted; and the governor appointed two members, — one, the most prominent railroad man in the State, and the other a retired merchant of the city of Memphis. And I wish here to say, that, of all the gentlemen on that board who had to deal with the yellow fever in Memphis in 1879, that layman was perhaps the most efficient. Why? Because he stood there as representing the business interests of the city and country. He could put his hand on his associates in business, and talk to them and impress them as a physician might not be able to.

"What I have said with regard to State boards may apply equally well to city boards. Every city board could have business men on it.

"Again, each board of health, in order to secure the greatest efficiency, in order to have the confidence of the entire medical profession, ought to have a representation not only from one school or society of physicians, but from the different schools; so that there will be no hesitation whatever on the part of any practitioner to co-operate with the board, and to render them every possible assistance.

"Hence these boards should not be regarded as governed by any code of medical ethics instituted by any society whatever, but they should be simply sanitary organizations, sanitary boards, governed by common courtesy and common sense in the administration of their work.

"It is not my purpose to detain the Association at this point with extended remarks. I simply throw these suggestions out, thinking they are matters which should be considered."

Dr. H. B. Baker of Michigan. — "I was interested in Dr. Bell's paper, which I think was worthy of thought, if we regard it as suggestive of the question of the relation of filth to pneumonia. But I think the evidence he offers is very far from establishing such relations. I should be much pleased if Dr. Bell would offer more evidence on the question. It seems to me that he assumes the point entirely without taking the trouble to bring the facts that lead to the conclusion. One point in his paper I wish to notice, and that is the apparent discrepancy between the results found by Dr. Delafield and those quoted from my paper. With regard to the humidity, I think the results were directly opposite; but I understand that Dr. Delafield employed relative humidity, which takes the opposite direction of absolute humidity. When I spoke of the humidity, I meant the absolute. With this explanation, I think it will be found Dr. Delafield's results agree with mine."

Dr. G. W. Foote of Illinois. — "I do not desire to detain the convention but a moment. I was interested in listening to the paper of Dr. Baker; and, having some little experience with diphtheria, I thought perhaps it might be well to mention some experiences of mine.

"I have been health officer of our town for a number of years, and during the last two years I took a thorough sanitary survey of the town. I caused two health police to visit every lot, every house, every nook and corner of our city, and to take a description not only of the lots, whether filled or in their natural state, but of the houses from cellar to garret, so that I knew just how many animals were kept on the lots, just where the wells were, in what vicinity to the privies, and the general lay of the lot; whether the houses were wooden or brick, what the condition of the rooms were, who were the occupants, and all about it. This information was condensed into a small compass, so that at any time I could refer to it, and from it could make up my mind as to the cause of disease in any locality. That brings me to the point of Dr. Baker's paper. I did not hear any cause given in his opinion for diphtheria except filth. That is not my experience entirely. After making an examination of the lots and houses, as I have before described, I had it before me to consult when cases of diphtheria, scarlet fever, etc., were reported; but on looking at my map I could give no reason for these diseases occurring where they did. I now turned my attention more particularly to the wells, to know whether a privy could be in such proximity as to be drained by the well, and from that to an examination of the water. I examined the water from a hundred and eighty-four wells. Some of the water would be bright and clear while there was sickness in the family, and the privy would be in the wrong direction to taint the water; so

that I could not think the cause of sickness was from this source. But under the microscope were revealed to me myriads of animalcula of all sorts and shapes, perhaps a half-dozen different kinds in different wells. I obtained in every case afterwards a sample of the water used, and in every instance where there was sickness I found these animalcules.

"One of the worst cases we had was a gentleman, his wife, and three children. One of the children was taken sick with diphtheria, and died. I had not attended it. The gentleman in whose practice it was sent for me to prescribe. I went next morning, and found one child sick with diphtheria, and an aunt and uncle affected with sore throat. The result was that two of the children died, while the father and mother recovered. My idea was this, that the children had drunk this water (which was fearful, but still it was bright and sparkling) exclusively; but the parents had used it chiefly through tea, and thus destroyed the impurities to a great extent. The uncle and aunt were in the habit of going to this house, and had taken of this water.

"The lot on which this house stood was thoroughly drained, and one of the most beautiful in the city: the privy was twelve rods from the house, and at least fifteen rods from the well. It was in the front part of the yard, and certainly I do not think the water could have been tainted by it. What it might have been, I do not know.

"This has been my experience in every such case, but in no other instances have I found these animalcula."

Dr. A. J. Miles of Ohio. — "In discussing this question of the prevention of the spread of contagious diseases, I wish to bring forward the method we have been compelled to pursue in Cincinnati, a large city densely populated by tenement-house population in certain portions, where diseases spread with great rapidity, and the mortality is great. We had an epidemic of small-pox in 1868–9, and again in 1876–7. It was fearful in some parts of the city. In the absence of municipal or State law enforcing vaccination, the Board of Health, through an efficient health officer and the school board, managed to stamp out the disease so effectually that during the last few years we have had few cases and no deaths at all.

"It was done by this method: we got the school board to enact the rule not allowing any child to attend the public schools who did not bear evidence of successful vaccination. That is enforced at the present time.

"Again, our city is divided into sanitary districts. A district physician is appointed to each ward under the direction of the health officer. All the poor are vaccinated by these district physicians, and re-vaccinated, until the vaccination is successful. The record of all this is kept in the health office. It was difficult to enforce this at one time. We have enforced vaccination in this way pretty thoroughly. The physicians of the city are required to report all cases of contagious disease. This is not done as well as it should be; but, in the case of small-pox, it is pretty well observed. The physician who delays in notifying the health officer is very apt to be arrested. I myself was arrested for failing to report, in twenty-four hours, a case I had. When a case

is reported, the house is inspected by the proper officers. If there is much crowding, the patients are sent to a pest-house, which is some distance outside the city; and the entire surroundings and sanitary condition are investigated. In our beautiful suburbs at Walnut Hill, where diphtheria seemed to be so very fatal, and where we have had some typhoid fever in connection with it, I have had the cisterns examined; and I find we have a great deal of animal matter contained in the water of the cisterns, which has accounted for the fearful mortality from diphtheria in this part of the city. I think this question of water-supply of cities is too much overlooked; that there will be found in many instances, as we have found in this part of Cincinnati, a great many cisterns within six, eight, and ten feet of the privy vaults; and, especially in cities like ours, part hilly and part of made ground, there will be ground slidings and settlings, which will interfere with the sealing of the cisterns, and allow the water to percolate through. The cistern water we had analyzed was more filthy than the water running through sewers into the Ohio River."

Adjourned to three o'clock P.M.

AFTERNOON SESSION.

On motion it was voted, That the paper of Dr. J. H. Pope of Marshall, Tex., on "The Sanitary Condition of the Mexican Population of Western Texas in its Relation to Public Health," and that of Dr. Atchison of Nashville, Tenn., on the "Disposal of our Dead," be read by title in order to allow the members of the Association an opportunity of attending the session of the Quarantine Convention. The papers were accordingly read by title, and referred to the Publication Committee.

The Association adjourned to seven and a half P.M.

EVENING SESSION.

The Vice-President, Professor R. C. KEDZIE of Lansing, Mich., in the chair.

The Secretary read an abstract of a paper prepared by Mr. James Gallatin, president of the Sanitary Reform Society of New York, on "Tenement-House Reform in the City of New York."

Professor S. E. CHAILLÉ of New Orleans read a paper on "Considerations of the Objections urged by some Evolutionists against Sanitary Laws, Boards of Health, and the Stamping-out of Certain Epidemic Diseases."

Hon. ERASTUS BROOKS of New York read a paper entitled "What the State owes the People; Public Health is Public Wealth," after which the Association adjourned to ten o'clock, Friday morning.

FRIDAY, DEC. 10.

The President, Dr. BILLINGS, in the chair.

Prayer was offered by the Rev. HUGH MILLER THOMPSON, D.D., of New Orleans.

Dr. A. L. Gihon, of the Executive Committee, read a large number of applications for membership, which the committee have reported favorably. The Association elected all the persons named to membership.

The following, from the Advisory Council, was recommended for adoption by the Executive Committee : —

RECOMMENDATIONS BY THE ADVISORY COUNCIL, AMERICAN PUBLIC HEALTH ASSOCIATION, SUBMITTED TO THE EXECUTIVE COMMITTEE DEC. 8, 1880.

The undersigned committee, having been appointed this day by the Advisory Council of the American Public Health Association to present for consideration such action as shall be expedient by this body as to certain points which appear highly important in the annual discourse of the President, Dr. Billings, respectfully submit the following : —

Whereas, The statements by the President in his discourse clearly present the demands which sanitary science makes for a complete and reliable system of national registration of diseases and of the causes of death, and also show that such records and the sanitary surveys of places and premises are essential means of successful public-health improvement, these recommendations, and also those relating to local sanitary associations, are earnestly commended to the attention of all boards of health and to the people throughout the United States. With the design to promote these objects, the following resolutions are recommended for adoption : —

Resolved, That the best interests of sanitary science and the public-health service require that the faithful registration of vital statistics, and especially the correct notation and registry of causes of death, together with a public record of prevalent diseases, should be maintained throughout our country ; also, that, wherever there are boards of health, such boards should require that the records of epidemics and other prevalent diseases, and of mortality, shall be correctly made and registered ; and call upon all State and local boards of health and other public authorities, the medical profession, and all members of this Association, to do whatever they can to promote such uniformity and thoroughness in the notation and registry of diseases and causes of mortality.

Resolved, That the American Public Health Association recognizes and earnestly commends the efforts of the National Board of Health to secure a practical basis of uniformity for the notation and nomenclature of diseases and causes of mortality, and again urges upon all State and local boards of health and upon other public authorities, the medical profession, and all members of this Association, to do whatever they can to promote such uniformity and thoroughness ; that we appoint a committee of three to have this subject under consideration for the purpose of reporting progress and plans relating thereto at the next annual meeting, and for co-operation with the National and State Boards of Health, and with the medical and statistical bodies that have this subject under consideration.

Resolved, That systematic sanitary surveys and inspection are essential aids to successful public-health works and to the progress and application of sanitary science. Therefore, this Association would urge upon State and local authorities the importance of such sanitary surveys and the sanitary maps and records that pertain thereto, and also would recommend that the registry of prevalent diseases

and of mortality be as frequently as practicable so co-ordinated therewith as to disclose the preventable causes which need to be removed.

Signed, on behalf of the Advisory Council, as its committee, —

ELISHA HARRIS.
HENRY B. BAKER.
JAMES A. STEUART.

The resolutions were adopted.

The following committee was appointed: Dr. Elisha Harris of New York, Dr. E. M. Snow of Rhode Island, Dr. Ezra M. Hunt of New Jersey.

Dr. AMES of Massachusetts offered the following proposed amendments to the Constitution, which were laid over to be acted on at the next annual meeting: —

PROPOSED AMENDMENTS TO THE CONSTITUTION.

In Art. III., at the beginning, introduce the words, "The members of this Association shall be known as Active and Associate. The Executive Committee shall determine for which class a candidate shall be proposed. The Active members shall constitute the permanent body of the Association, subject to the provisions of the Constitution as to continuance in membership. The Associate members shall be elected only for the year for which they are proposed, and shall have all the privileges and publications of the Association, but shall not be entitled to vote. They may be re-elected."

In Art. III., in the first line, after the word "the" and before the word "members," insert the word "active;" so that the line shall read, "The *active* members shall be selected with reference," etc.

In Art. III., last line, insert the words "in either class" after the word "membership;" so that the sentence shall read, "The annual fee of membership, *in either class*, shall be five dollars."

In Art. VIII., second line, after the words "First Vice-President," insert the words "Second Vice-President;" so that the sentence shall read, "There shall be a standing committee, to be known as the Executive Committee, which shall consist of the President, First Vice-President, *Second Vice-President*, Secretary, Treasurer," etc.

In Art. VIII., in the last line but one, strike out the words "six weeks," and insert the words "one week;" so as to read, "At least *one week* preceding the date of such meeting."

The Executive Committee reported back the resolutions introduced by Dr. D. W. Hand of Minnesota on Thursday, with the recommendation that the first be stricken out, and the third be amended to read as follows: —

"*Resolved*, That, as we know little or nothing of the origin of diphtheria, we will request the National Board of Health to continue its investigation of the causes of this disease."

The recommendation was adopted.

The Executive Committee reported back the resolutions introduced on Thursday by Dr. James H. Letcher of Kentucky, with the recommendation that the first resolution be stricken out, and that the other two be embodied in the following: —

"*Resolved*, That the boards of health of the several States in the Union, or, where no State boards of health exist, the State medical societies, be requested to take the matter of restricting and preventing small-pox under immediate advisement, and direct the attention of all local boards of health to the importance of seeing that all persons in their respective districts are properly protected by vaccination."

Recommendations adopted.

Dr. HENRY B. BAKER of Michigan offered the following resolution: —

Resolved, That five hundred copies of the address before this Association, by Hon. Erastus Brooks of New York, on "What the State owes the People," be printed in pamphlet form, and copies be sent to the governors of States, together with a communication respectfully asking them to consider the propriety of calling the attention of the legislative bodies in their States to the importance of action in the directions indicated in the paper.

Adopted.

The resolutions offered on Wednesday by Dr. C. W. Chancellor of Maryland, and reported back by the Executive Committee Thursday without action, were taken up and adopted.

The Executive Committee made the following report on the resolution offered by Dr. McCormack of Kentucky: "That it be amended to read as follows: —

"*Resolved*, That, for the purpose of securing uniformity in legislation in the States of this Union for the prevention of venereal diseases, the Committee for the Prevention of Venereal Diseases be reconstituted, and instructed to prepare draughts of a State law, and of a municipal ordinance, calculated to secure the desired results, and report at the next annual meeting of this Association."

Adopted.

The President appointed the following committees: —

On Prevention of Venereal Diseases. — Albert L. Gihon, M.D., Medical Director United States Navy, chairman; J. M. Keller, M.D., Hot Springs, Ark.; George M. Sternberg, M.D., Surgeon United States Army; D. C. Holliday, M.D., New Orleans, La.; Preston H. Bailhache, M.D., Surgeon United States Marine Hospital Service; John Morris, M.D., Baltimore, Md.

On Epidemics and Trained Nurses. — W. T. Walthall, Mobile, Ala.; Hon. John Johnson of Memphis, Tenn.; G. A. Ketchum, M.D., Mobile, Ala.; Hon. John Eaton, Washington, D.C.; H. B. Horlbeck, M.D., Charleston, S.C.

On motion of Major Walthall, the President, Dr. Billings, was added to this committee.

The following were announced as the Advisory Council for the ensuing year: —

Alabama. — R. D. Webb, M.D., Livingston.
California. — Henry Gibbons, M.D., San Francisco.
Florida. — Hon. S. C. Cobb, Pensacola.
Georgia. — W. H. Elliott, M.D., Savannah.
Illinois. — J. H. Rauch, M.D., Chicago.
Indiana. — J. F. Hibberd, M.D., Richmond.
Mississippi. — Wirt Johnson, M.D., Jackson.
Louisiana. — Edward Fenner, New Orleans.
Maryland. — James A. Steuart, M.D., Baltimore.
Massachusetts. — R. T. Davis, M.D., Fall River.
Pennsylvania. — Henry Hartshorne, M.D., Philadelphia.
Ohio. — T. C. Minor, M.D., Cincinnati.
Missouri. — George Homan, M.D., St. Louis.
Rhode Island. — E. M. Snow, M.D., Providence.
Tennessee. — Hon. John Johnson, Memphis.
Virginia. — J. G. Cabell, M.D., Richmond.
Michigan. — Henry B. Baker, M.D., Lansing.
Iowa. — W. S. Robertson, M.D., Muscatine.
West Virginia. — James E. Reeves, M.D., Wheeling.
District of Columbia. — Smith Townshend, M.D., Washington.
New York. — Elisha Harris, M.D., Albany.
North Carolina. — Thomas F. Wood, M.D., Wilmington.
South Carolina. — H. D. Fraser, M.D., Charleston.
Connecticut. — C. W. Chamberlain, M.D., Hartford.
New Hampshire. — S. P. Conn, M.D., Concord.
Vermont. — Henry D. Holton, M.D., Brattleborough.
Texas. — J. H. Pope, M.D., Marshall.
Wisconsin. — J. T. Reeve, M.D., Appleton.
Minnesota. — C. N. Hewitt, M.D., Red Wing.
New Jersey. — D. C. English, M.D., New Brunswick.
Arkansas. — A. L. Breysacker, M.D., Little Rock.
Kentucky. — Pinckney Thompson, M.D., Henderson.
Delaware. — L. P. Bush, M.D., Wilmington.
United States Army. — Joseph R. Smith, M.D., Surgeon, San Antonio, Tex.
United States Navy. — A. L. Gihon, M.D., Medical Director, Washington, D.C.
Commissioner of Education. — Hon. John Eaton, Washington, D.C.
Marine Hospital Service. — P. H. Bailhache, M.D., Surgeon, Washington, D.C.
National Board of Health. — Stephen Smith, M.D., New York City.

Hon. Erastus Brooks moved that the Advisory Council appoint a member to represent this Association in the International Quarantine Conference, if such be allowed. Adopted.

There being no further business, Professor Chaillé was invited to address the Association on "The Summary of Conclusions of the Havana Yellow-Fever Commission," to which invitation he responded.

The Hon. L. Q. C. Lamar, Senator from Mississippi, was introduced to the

Association by President Billings. Senator Lamar thanked the convention for the cordial greeting accorded him, and would make a few remarks to them, but had nothing to say.

Dr. J. D. Bruns of New Orleans then read a paper prepared by him on "The Fevers of the Lower Coast."

Discussion.

Dr. Cochran of Mobile. — "I do not propose, gentlemen of the Association, to enter into any elaborate discussion of the report which has been read here with reference to the fever on the Mississippi coast, below New Orleans. In order to do that, I should be obliged to study the question as accurately as the gentleman who has written the report, and as much in detail. Neither do I propose to go over, in the few remarks that I shall make, any of the clinical grounds which he has presented, relating to the seven cases that were investigated by the committee from which emanated the two reports that have been referred to. Even in what I shall say I feel that I occupy a somewhat embarrassing position, because it looks like thrusting one's self into a controversy in an ungracious way; and I desire to say that I have no concern in this matter as a personal controversy at all. I simply propose to make a few remarks with reference to the impression created in the neighboring State of Alabama, and perhaps to a certain extent in other States of the South, with reference to the fever, and upon the general question of diagnosis of fevers in New Orleans, and in the vicinity of New Orleans, because these are matters of considerable interest to towns situated in the neighborhood of New Orleans, as Mobile, and considerable interest also to towns farther off, but in danger, according to the accepted doctrines, of infection from yellow fever if it should break out in New Orleans.

"It was not stated in the report read whether fevers similar to that which prevailed on the Mississippi coast during the past summer have prevailed there in other seasons. It is not stated in the report, nor do I know whether it has been stated at all, whether these fevers have existed in other seasons in this neighborhood as they have existed this season. These, as will be readily seen, are points of considerable importance in endeavoring to estimate the character of this fever. If this fever has never occurred under the same circumstances, so far as topography, meteorology, and the environment of rice-fields are concerned, I say, if this fever occurred only this season, while the conditions have been the same in other seasons, we would have to cast about to account for the fact. Inasmuch as this fever has attracted so much attention, I take it for granted that similar epidemics have not occurred in that vicinity heretofore.

"There is one other point to make, and that is, that a great many statements made with reference to this fever in an informal and unofficial way have not been alluded to at all in the report which has been read. The report is almost entirely confined to the clinical discussion of the seven cases that were

examined by the committee, and to the opinions of the resident physicians. It seems to be a fact, however, that, in a certain proportion of these cases, black vomit occurred. It seems, also, that, in a certain proportion of these cases, albuminous urine occurred. It is also asserted that this epidemic of fever was of a mild type. It would be in conflict with all previous experiences in reference to malarial fevers, that, in an epidemic in which it would seem five hundred or six hundred cases had occurred, the type was so generally mild; yet, at the same time, some very severe cases did occur.

"It is true, that, in certain forms of malarial fever, albuminous urine may be found; but such fever is of a congestive type: and it is not asserted that one single case of this character occurred in the fever under consideration. It is also asserted that albuminous urine may occur in hemorrhagic malarial fever; but this is also a congestive variety of fever, and the albuminous urine is always tinged with bloody pigments, and it does not appear there was any such appearances in these cases: therefore these cases were not what is ordinarily designated as hemorrhagic fevers. It is also certain that dark vomit may be present in cases of malarial fever; and even some concede that very rarely black vomit — hardly distinguishable, if at all, from that of yellow fever — may occur in hemorrhagic fevers. Now, I mention these considerations to show why, when these reports of fever were discussed away from New Orleans, very grave suspicion was aroused in the minds of those who were charged with the protection of the public health.

"With reference to the character of this fever, members of boards of health in adjacent cities had grave doubts as to its character. In connection with this same question, I desire to refer to cases of dengue in New Orleans in this and previous years, which have been characterized by black vomit, hemorrhages, albuminous urine, and have died. In Mobile we had dengue two years since the war, but it had not been characterized by these symptoms nor by death: the same is true of Savannah. Now, with this conception of dengue in our minds, we people up the country are obliged to look with very grave suspicion upon cases of dengue that are characterized by the symptoms I have mentioned. One more point, which may, perhaps, explain the liability of these gentlemen to make a mistake, if they have made one: Yellow fever, dengue, malarial fevers, prevail in New Orleans in the same area; and these gentlemen are called upon to study them together, and it may be that they have got the diagnosis somewhat confused. But, to sum up with reference to diagnosis of yellow fever, I have long been taught to believe yellow fever was separated from other fevers by a few symptoms almost peculiar to itself. First, that it is a hemorrhagic fever; second, the urine is frequently albuminous; third, it is a continued fever of one paroxysm; fourth, a want of parallelism between the pulse and the temperature. If, by means of these signs, we are not able to separate yellow fever from others, I would be much obliged to the gentlemen here in New Orleans to give me some diagnostic marks by which it can be discriminated. It seems to me they break down by means of differential diagnoses, and leave us at sea on this question; and we are no longer able to say whether a fever is yellow, dengue, or malarial.

"Dengue is an infectious fever: it has not been quarantined against because it was not considered dangerous; but, if we have been mistaken, and dengue is dangerous, and characterized by black vomit, etc., then we will be compelled to quarantine against it the same as yellow fever. I hope physicians of New Orleans will understand that I am presenting these difficulties as they occur to us at Mobile, and must occur to other health boards, and an explanation of the very grave suspicion which these various health boards necessarily feel when they learn that there are cases of fever in New Orleans characterized by the symptoms which they have always recognized to belong to yellow fever alone."

Dr. G. M. STERNBERG, U.S.A. — "Mr. President, I find a very difficult task imposed on me. I had prepared a paper on the diagnosis of yellow fever, which I have had printed, because it was my intention to read it by title only. The lengthy paper read to-day, which has been devoted entirely to the effort of annihilating Dr. Sternberg, it will be impossible for me to answer on this occasion. It must be apparent to all of you, that, to review such a paper, time is required. I have neither the readiness in debate, nor have I been able to take sufficiently full notes of the long paper just read, to prepare an answer. The paper which I have prepared on the diagnosis of yellow fever covers a number of the points made by Dr. Bruns; and I will now read it, without attempting to go into a full discussion of his paper, which, as I have before shown, it would be impossible for me to undertake at this time."

Dr. S. E. CHAILLÉ of Louisiana (New Orleans). — "I will say in a few words what I desire to bring before the Association.

"In the various statements of interest presented by Dr. Bruns, there is one only with regard to which I have personal knowledge; and that one statement is so extraordinarily erroneous that I think it is proper to call the attention of the Association to that statement. In speaking of the experience of my colleague (Dr. Sternberg), I do not say it was done designedly, but the effect was to make his experience as slight as possible. It was stated that Dr. Sternberg's first experience began in recent years in New York; then, that he visited Havana in the summer of 1879; that the experience he gained there was from an excessively healthy summer.

"Now, Mr. President, it was my duty, as chairman of the Havana Commission, to obtain from all sources official reports; and I have official statistics from the highest authorities from 1851 to 1880, all of which are to be found in the final report of that commission, and will be published shortly. Amongst these tables are summarized statistics of yellow fever during the past ten years, from 1870 to 1880. The following result is shown by those statistics: that during these ten years the average mortality in Havana has been somewhere between one thousand and twelve hundred; in the very unhealthy year of 1878 the mortality was seventeen hundred; in 1879, the summer it was visited by the commission, that mortality was sixteen hundred, — that is to say, a very large number above the usual average.

"Now, how on earth and from what source could the information come

which proved that the summer of 1879 was an excessively healthy one, I am at a loss to imagine. I may say further, that in the summer of 1878 the yellow fever began earlier than in 1879; and therefore the result was, during the three months, June, July, and September, deaths from yellow fever were above the average. There are several other points in Dr. Bruns's paper which are apt to leave an erroneous impression. I do not think he made the assertion, but the impression was conveyed, that, because there were so many mild cases of the disease in this disputed point, that was a very strong argument none of these cases could have been yellow fever. I don't think the record of yellow-fever outbreaks in New Orleans, or other parts of the world, will justify this implication.

"Again, Dr. Bruns implies that it is a very strong argument indeed, because there was constant and uninterrupted intercourse at this point; and this intercourse did not result in any spread, therefore the disease could not be yellow fever. I think that facts will not justify any such conclusion. Not only here, but in all instances, we see constantly that there are sporadic cases of yellow fever, oftentimes localized in a single house, with no means for excluding intercourse with this place; and still, for reasons we do not understand, over and over again it has happened that there has been no extension of the disease.

"Again, I think there is something of an erroneous impression produced by the failure to appreciate what is the difference in position between a sanitarian and a clinical observer. If we admit that yellow fever is a communicable disease, the responsibility falling on the sanitary officer is much greater than on the clinical observer. He is compelled, in the interest of other communities, to regard with graver suspicions those rumors which the clinical observer might pass."

Dr. J. P. Dake of Nashville, Tenn. — "I did not send up my name because I wished to speak on the subject-matter of the paper of Dr. Bruns, but because I wish to speak of the general character of that paper, and, in my judgment, of its inappropriateness here. I submit that this Association is not intended to be the place for the righting of mistakes made by the National Board of Health, nor the inspectors sent out by that Board. Neither is this the place for the bringing in of matters of controversy between practitioners. Now we have had an hour or more of our time occupied by this paper, which has arraigned one of our members very severely. What is the result? Either that member appears here to great disadvantage, wholly unprepared to answer those matters, or he is obliged to have this whole matter printed and spread abroad in the proceedings of this body, and wait a year before he can have the opportunity of making any adequate reply; because such charges require that proofs be gathered and put together in proper shape. When we meet next, Dr. Sternberg has the most undoubted right to come before us and submit his proofs and defend his professional character. Is this the purpose of the Association? Is our time to be thus occupied? I say, as a member, No; and especially when it is a matter of fact that there are papers handed in here

on subjects of general interest, matters of original inquiry, which are returned to the authors, and are passed over without being read or discussed. When our time is so limited, and we have such a press of matter, I protest this is not the place for such papers; and I am surprised that the Executive Committee, on examining that paper, should have allowed it to come in here. The place for such discussion is in the Bulletin of the National Board of Health, or in 'The Sanitarian' of our friend Dr. Bell, or in some journal or pamphlet, but not here where we are gathered from all parts of the country to discuss questions concerning us all."

Dr. HAYS of Louisiana. — "It is not my intention to enter upon a discussion of yellow fever or its diagnosis, but I shall proceed to throw some additional light upon the history of the fever that prevailed upon the lower coast last summer.

"I must say that I differ with the gentleman from Alabama in that 'this Association has nothing to do with the discussion of this fever, and that it is a local issue altogether;' and I hold emphatically that the question as to whether the fever which prevailed at Point Michel was or was not yellow fever is of national importance, and affects the vital interests of every State in the Mississippi Valley or that borders upon the Mississippi and Ohio Rivers.

"There is an apparent discrepancy between my statement to the gentlemen first sent by the resident member of the National Board of Health to investigate this fever, — that the first case occurred some time in September, — and that which occurred in my published letter, giving the date of the first case as Aug. 31. The fact is that I counted from the few cases that immediately preceded the commencement of the epidemic; but that previous to that time, clear back to the spring, I had occasional cases in my practice. In the month of April of this year I treated a case of this same fever at Point Michel, a mulatto girl about five or six years old, who died with the same symptoms as those who died in September and October, and who vomited as decided a black vomit as any of the so-called cases of the last-named period. If the Point Michel fever was yellow fever, then it prevails in the parish of Plaquemine every year. I hardly think any one will attribute that case in April to the infection introduced by the bark 'Excelsior,' which reached this port in August. The minority report of the commission attributes the beginning of the infection to the bark 'Excelsior,' and says the first case occurred at a point directly opposite the place where the vessel was anchored; and further says that where there was no batture there were no cases. It is a well-known fact to every one at all familiar with the topography of that section of country, of Buras settlement, that from below Fasterling's store, which is directly opposite to the quarantine station, to a distance of about six or seven miles above that place, there is not a vestige of batture; that the entire distance has a caving front, and only recently two or three square acres caved in at one time in that section; and where stood an orange-grove there is now a depth of fifty or sixty feet of water. That should effectually dispose of the theory that the infection gradually moved up the coast until it reached Point Michel. The statements are contradictory.

"As regards the mortality (fifteen deaths in two hundred and thirty-four cases that occurred in my practice), there were three who would not submit to medication at all, and virtually had no treatment; one who died of a colliquative diarrhœa twenty-six days after his first seizure; and another who died of exhaustion, succeeding five or six days of violent epileptiform convulsions, during which period he had no fever.

"I mention this to show that the number of cases which did not yield to the quinine or cinchonidia treatment was not so great as stated by the gentlemen signing the minority report.

"I will not further occupy the time of the Association, as I believe the time allotted me for debate has expired."

Dr. J. G. THOMAS of Georgia. — "It occurs to me the remarks made by the gentleman who preceded me (Dr. Dake) are in some degree correct. This is not the place for this discussion, but still it is here. It is evidently, to boil it down, a dispute between doctors over diagnosis. This is an old trouble that has existed among doctors from time immemorial. Now, I have seen something of both these diseases, yellow fever and malarial fever, but assert that no man, with the study given in the cases referred to, could tell whether the disease was yellow fever or not. A *post-mortem* should have been made to settle that question. There is no account of a single *post-mortem*. They were only there about two days. That was not sufficient to settle so important a question. This is not so important now as it was at that time. At that time it must have been a very important question to this town. That is past. It now becomes simply a question of error on the part of one board or on the part of some people, and not on the part of others. So far as the National Board of Health is concerned, they are criticised for having determined in favor of one party. It gave the people outside of this city, and all along the river up to St. Louis, the benefit of the doubt; and I say, so far as we are concerned, it gives us additional confidence in that Board for having decided as it did. Then these examinations were made in a very imperfect manner. In one case, after a brief notice, the physician decided it was not yellow fever. He did not put his ear to the patient's heart, because the man was too dirty. That is not the kind of examination I believe in. It is not the kind of examination any of us would believe in under the circumstances. It teaches us one thing, — men should be sent to make these examinations who will remain on the spot days and days, make a *post-mortem* examination, and do every thing in a thorough manner."

Dr. J. P. DAVIDSON of Louisiana (New Orleans). — "Mr. President and gentlemen, I am allowed five minutes to discuss a question which has occupied medical men over two hundred years; viz., the subject of yellow fever and its diagnosis. I cannot pretend in five minutes to decide any question of that kind. I can only refer in a brief manner to the subject of this fever below, and what has been said about it on this floor; but I beg, in the beginning of my remarks, to deny all personal feeling in the matter. I have none whatever. I make no objection to the opinion of Dr. Sternberg relative to the disease as

contradistinguished from that of Dr. Bruns and myself; but I have strong feeling relative to the true character of the disease prevailing down there, and its importance on this community and upon the whole valley of the Mississippi. If that fever which I saw with Dr. Bruns and Sternberg was yellow fever, then I say, without the slightest hesitation, that you may pull up your quarantine stakes, and relegate the whole subject of quarantine to the tomb of the Capulets. For that fever, I know from all the testimony brought to my mind, was not limited to the seven cases we saw at the bedside. We were compelled to make a diagnosis of the cases presented to us; but the commission did not limit themselves to the diagnosis of the cases they saw, but took the testimony of the medical men practising there relative to the treatment of the disease. We were there in October; and the testimony of the practitioners, aided and backed by sensible residents, old Creoles, men who had lived and grown old there, was all to the same effect. And when I interrogated these people in their own language, "What do you call this fever?" the invariable reply was, "A fever of the country," using the technical expression of our own literature on the subject. "We have it every year;" and they seemed to be astonished that so much concern should be made over what was to them familiar.

"Physicians who examine a case of disease want to know its stages: they want to know its temperature, its pulse, etc. I saw no case that gave me the strong features of yellow fever; no case in which the high temperature was followed by depression, such as you see in yellow fever, where all the vital powers seem to be expended, the pulse becomes slow and feeble, and the man lies overcome by force of the disease, either to die or undergo a re-action, when the system will assert its power, and restore its vital energies; or, if it cannot do so, he is attacked with black vomit, and passes away. There was no such history in the cases we saw. We were met with pleasant countenances; in two or more instances the patient rose to see us; they rose to protrude their tongues; they conversed cheerfully; there was none of the marked feeling of suffering that you see in yellow fever, — none whatever. I saw no case of black vomit, no bleeding gums, no bleeding of the nose, no discoloration of the skin, no discoloration of the eyes, tongue broad and white, no red edges, no red tip to it. We all know, those of us who have passed through yellow-fever epidemic, there are cases, oftentimes, of a type so mild that the treatment is relegated to the nurses. Those cases go on to convalescence very rapidly. But in no history of yellow fever, or in an epidemic embracing so large an area and so many persons as here, can it be shown that the severe forms of yellow fever did not present themselves, — forms of excessive, black vomit, discoloration of the skin, hemorrhage of the bowels and the nose, and rapid deaths. In that whole strip of country there was nothing of the kind."

Dr. S. E. Chaillé of Louisiana (New Orleans). — "I would say in the first place that I have no object in view but the truth, and I would like to ask Dr. Davidson of what disease the Giordano children died. In one case it was diagnosed by a competent physician as yellow fever."

Dr. J. P. Davidson. — "I am totally unable to say. I did not see them, and

I know nothing of their history. No *post-mortem* examination was made in any case. I agree with Dr. Thomas that no diagnosis should be made absolute without a *post-mortem* examination. No examination was made of those children.

"Any one who has seen hemorrhagic malarial fever knows that death occurs under circumstances similar to those in the cases described."

The Association took a recess until three P.M.

AFTER RECESS.

The recess having expired, the Association re-assembled.

Discussion.

Dr. J. P. DAVIDSON of Louisiana (New Orleans).—"Mr. President, at the time of adjournment I was interrupted by a question put to me by Dr. Chaillé with reference to this disease, which occurred in the parish of Plaquemine, or in one family, the Giordano, four of whom died in that parish, and one in St. Bernard, treated by Dr. Howe. I was unable to answer the question specifically, for I never had seen any of the cases; and up to the present time, with the exception of what Dr. Howe has furnished, I have no clinical notes whatever. That they died of black vomit, I was told. I do not know that they had albuminous urine, or presented the appearance of a yellow-fever cadaver. What treatment they received I do not know. Their surroundings and nursing I was ignorant of: consequently it was impossible to make any diagnosis of that disease on hearsay evidence. They made strong impression on my mind as suspicious cases of disease, either yellow fever or approximately resembling it. In New Orleans, at one or two localities, similar cases occurred. They were attended by competent physicians, who made careful examinations of every symptom in the cases. One or two of the cases died. No *post-mortem* was made in any one of them; but in three or four similar cases they were pronounced to be hemorrhagic malarial fever, and they recovered. Their recoveries were very rapid. The term hemorrhagic fever has been given in consequence of epistaxis, the throwing-up of blood, etc. One of these cases was attended by Dr. Watkins. A very accurate record of the temperature was kept; and in that case the temperature did not rise to the temperature of yellow fever until the third day, and the convalescence began on the morning of the fifth day, and was extraordinarily rapid. Now, I think it is generally assented to by the profession that in yellow fever the rise of temperature begins on the first day, and attains its maximum on the second. In malarial fever that is not the case. The temperature does not attain its maximum until the third, fourth, or fifth day. In yellow fever the nausea attending it is usually apparent on the second or third day, and is rarely seen on the first day. In malarial fever the nausea begins with the disease.

Now, in the cases below, a nausea accompanied some of them, vomiting was rare, and occurred in the first paroxysm the first day. I heard of no case

where the vomiting came on as in yellow fever. Dr. Sternberg, commenting on the paper of Dr. Bruns, distinctly spoke of the number of cases of black vomit. I saw none. The only ones I heard of were the Giordano cases.

"Relative to the yellow fever from the 'Excelsior.' The spread of the disease from that vessel would seem plausible. If one had to find a source, they would naturally fall back on the 'Excelsior' as the only infected vessel lying near the place during the summer. The yellow-fever cases were taken from her to the hospital. No person at the quarantine station took the fever; though, to my surprise, when I went on the tour of inspection, I found a house adjacent to the station crowded with children. Where did these children come from? They were not attached to the quarantine station, but lived just outside; and the State board of health had no control over the place. None of these children were taken with yellow fever, although living adjacent to the quarantine station. I know, moreover, that several of those children went to the yellow-fever hospital at the time yellow fever was under treatment there."

Dr. HENDERSON of Louisiana (New Orleans). — "What Dr. Bruns saw he was perfectly right in describing as malarial fever. Dr. Sternberg tells us what he saw, and he is right; for he saw yellow fever. The doctor had seen single cases of yellow fever, from which there was no spread; not once, but many times."

Dr. BELL of New York. — "The whole purpose of my asking for a few moments, is to ask a question which I think has not been employed in any thing hitherto said about this subject. It is said yellow fever could not have come from this ship, because it was on the other side of the river. I have a little knowledge of the situation of the quarantine establishment on the Mississippi River. The question is, Has the policing of that station this year been such as to cut off all communication with the people who reside on the other side of the river, who are habitually trading with ships in quarantine at the Mississippi station? If it has been so this year, I am inclined to think it has just become so; for it was not so policed some time ago. I fully agree with Dr. Thomas, that, the moment suspicion was aroused, — knowing, as I believe the National Board of Health does, that this quarantine station is lacking in efficient police, — it became the absolute duty of the National Board of Health to send inspectors there to ascertain, as far as possible, the state of the case. It was found that a severe disease of some kind, whether yellow fever or not we will not discuss, was prevailing, and, from the number of cases, prevailing as an epidemic; and it became necessary to take measures to check its spread. I am not prepared to say it was yellow fever. And I may be permitted to state here, with all due deference to the paper read, that I cannot agree with its certainties of stating the case. I have had, in an experience of thirty years, some knowledge of yellow fever under a variety of circumstances; and I have never in my life been able to say in the first cases positively whether or not they were yellow fever. In my intercourse with professional men of greater experience than myself, I find the same rule obtains. I call to mind the cases that occurred at Bay Ridge, near Fort Hamilton, twenty years ago, when those

who had seen yellow fever before were called to pronounce on it. Some declared it was not yellow fever at first. I could not pronounce on it; but in less than two weeks nobody doubted what it was."

Dr. DEVRON of New Orleans. — "Gentlemen, as a resident of this city, having all my interests, all that is dear to me in it, having been formerly Sanitary Inspector of the Board of Health of Louisiana, knowing the difficulty we have to obtain the truth in all cases, even with the best of intentions on the part of the physicians, I come here to inform you that in this city there are men actuated by the best motives, with a determination to tell the truth, who cannot be suspected of wishing to lie, who will deny there is yellow fever here, when others equally well informed will say it is here. They honestly, conscientiously believe that a fever, having all the symptoms of yellow fever, occurring in a native, cannot be yellow fever. Those men will come and honestly swear, on the faith of a Christian, that it is not yellow fever; and I know them to be honest, for I know them personally. Others, again, have come to a different conclusion; and I confess I am one of those who have been converted to the doctrine that the Creole does get yellow fever. During the epidemic of 1878 Dr. Choppin had to address a communication to the gentlemen who, he knew, held such opinions, and ask them to report to him, not their cases of yellow fever, but of paludal and hemorrhagic fever, in order to obtain the correct figures of the number of deaths from yellow fever. Those names were furnished: the Board can verify my statement."

Dr. THOMAS of Georgia. — "I do not desire to reflect on either one of these parties. All I desire to say is, that I think the investigation ought to have gone on longer than it did. Those gentlemen should have gone down there, and spent five or six days, or a month if necessary, and made all the *post-mortem* examinations; and then they would not have had this unreliable report. They should have brought back a chart of every case, and a *post-mortem* examination of every case: and I think that is very essential; for I have seen many cases I would not trust the diagnosis of, unless I had examined the liver and condition of the stomach. How many die of black vomit in the stomach, — that never comes up. Many of those cases may have had black vomit in the stomach. They give us no facts of that kind; and no man can be Sir Oracle on the subject of yellow fever. No one who has ever seen yellow fever will take these oracular statements, unless supported by much stronger evidence than has been given."

Dr. STERNBERG, U.S.A., offered the following resolution: —

Resolved, That the National Board of Health be requested to appoint a competent person, free from local prejudice due to a previous expression of opinion, to make a thorough investigation of the epidemic fever which has occurred in Plaquemine Parish during the past summer.

Dr. R. B. S. HARGIS of Pensacola, Fla., read a paper on "Yellow-Fever Recognition and Isolation."

Dr. B. F. GIBBS, Medical Inspector U.S.N., read a paper entitled "A New Method of Experimental Investigation into the Cause of Yellow Fever upon the Basis of Similar Densities."

The following papers were read by title: "History of Camp Joe Williams in 1878," by Dr. R. B. Nall of Memphis, Tenn.; "Report on Yellow Fever in Key West, Fla., in 1880," by Dr. F. W. Lester of Key West, Fla.

Dr. CHARLES B. WHITE of New Orleans, La., the President elect, was introduced to the Association by Dr. Billings. Dr. White returned thanks for the honor conferred in a short speech.

Dr. AZEL AMES, Jr., of Massachusetts, offered the following: —

Resolved, That the thanks of this Association be most heartily given

To the Hon. H. P. Kernochan, for his invitation to visit Scarsdale Plantation.

To the New Orleans Railroad Company, the Carrollton Railroad Company, the Orleans Railroad Company, and the New Orleans and Spanish Fort Railroad Company, for the gratuitous service of their cars.

To the Orleans Club and the New Louisiana Jockey Club, for the courtesies they have extended the members.

To the president and members of the Local Committee of the citizens of New Orleans, for their earnest efforts to make the visit of the Association one of uninterrupted pleasure.

To Dr. L. F. Salomon, chairman of the Committee of Arrangements, for his polite and assiduous attention to the members, whose demands upon him, however exacting, failed to exhaust his resources of patience and courtesy.

To John C. Henderson, Esq., the secretary of the Committee on Transportation, for his untiring labor in welcoming the coming and speeding the parting guests, who are glad to be able to know him hereafter as a fellow-member.

To J. C. Clark, vice-president and general manager of the Chicago, St. Louis, and New Orleans Railroad; Major D. B. Robinson, superintendent of the New Orleans, Mobile, and Texas Railroad; Charles A. Whitney, Esq., president of Morgan's Louisiana and Texas Railroad and Steamship Company, and the other railroads; and to the Anchor Line of St. Louis, for their valuable aid in obtaining transportation for members.

To the Western Union Telegraph Company, through J. T. Alleyn, Esq., for their liberality in transmitting messages without charge.

To the press of the city, and to the agents of the Western Associated and New York Associated Press, for the extended notices they have published of the proceedings of the Association.

To W. H. Bell, civil engineer of New Orleans, for his map of the city of New Orleans; and, finally, to the citizens of this hospitable city, who have manifested in every way their interest in and kindly regard toward the members of this Association throughout their stay.

Adopted.

A number of applications were recommended by the Executive Committee, and the persons recommended were elected members of the Association.

Dr. HARRIS of New York offered the following: —

Resolved, That the thanks of the Association are most cordially offered to Dr. BILLINGS, its retiring President, and to the Secretary and other officers who now retire from the official service of this body.

Adopted.

Dr. D. C. Holliday of Louisiana (New Orleans) offered the following: —

Whereas, Death has stricken from the roll of members one who, from his well-known zeal in the cause of sanitation, was selected at the last meeting of this Association as its first Vice-President;

Resolved, That, in the death of Dr. Samuel P. Choppin, this Association has lost a valued member, the medical profession one of its brightest ornaments, and the State a patriotic, self-sacrificing citizen. In public life his administration of affairs reflected credit to himself, and insured welfare to the State. In all the qualities of mind and heart which adorn the upright, bold, and unswerving patriot and citizen, and grace the accomplished surgeon and physician, he presented a fulness of character rarely equalled, and never surpassed. To these must be added, as singularly conspicuous and fascinating, the social amenities and virtues which lent to his whole private life a charm as captivating and resistless as the sterner qualities of his character.

Adopted.

Dr. H. B. Baker of Michigan offered the following: —

Resolved, That this Association deems it important that, in times of doubt, respecting the nature of an outbreak of a disease which has some of the characteristics of an epidemic disease, the National Board of Health and State and local boards of health should give the benefit of the doubt to the side of safety to the people, of whose lives they are the sworn official guardians; and that in all such cases all boards of health should take such action as will be applicable for the restriction of the epidemic disease which it is reasonably suspected exists.

Adopted.

Dr. Sternberg's resolution was called up. It was seconded by Dr. Harris.

Dr. Porter of Tennessee. — "I hope that resolution will be passed. Whenever there is a chance to get an expert on yellow fever, then I am in favor of it. I do not believe there is a man anywhere who knows any thing about it. I do not believe there is a man who can swear to any thing about yellow fever, except that it kills. I know if there is a man who does, the National Board of Health will find him. In 1873 our physicians quarrelled day after day and week after week over the question as to whether yellow fever existed, and never did settle the question. In 1878 there was a continual quarrel over the question. In 1879, after we had lost a number of our people, and had got nearly all the remainder away, I met one of our oldest physicians, who said it was outrageous that I should have reported yellow fever in Memphis; that there was not a case of fever in the city. 'Well, doctor,' I said, 'I do not know what it is; but it is killing our people, and I want to get them out of town.'"

Dr. Crawcour of Louisiana (New Orleans). — "If, as the gentleman who last spoke says, no one knows any thing about yellow fever, how can an expert be appointed? For my part, after a long experience with yellow fever, I honestly acknowledge there are many difficulties in the way of making a correct diagnosis of yellow fever; but I do believe we know something about it. I do not believe we know every thing, but we do know something. I

also say that it is exceedingly difficult, and perhaps almost impossible for any man, however much he may have seen of the disease, to make an absolute diagnosis from one, two, three, or four isolated cases."

Major WALTHALL of Alabama. — "Would it not be better for some other party than the National Board to appoint this expert, as it was one of the interested parties? The decision of the expert might not be accepted or satisfactory to the Louisiana State Board of Health."

Dr. STERNBERG. — "I withdraw the resolution. I named the National Board, because I knew of no other power to make the appointment or defray the expense."

The PRESIDENT (Dr. Billings, — Dr. White in the chair). — "I have listened with great interest during the sessions of this Association to the essays and speeches we have been favored with, and of those which either directly or indirectly involved the question of yellow fever. I had not intended to make any speech on this subject, and my idea of the situation can be perhaps illustrated by referring to two anecdotes. The first is that of the ancient grammarian, who solemnly, at the end of a controversy, cursed his opponent for his theory of the irregular verb; and the second of the Scotchman, who said, 'He held for a long time there were but two members of the visible church in Scotland, — himself and his brother; and recently he began to have some doubts about his brother.' [Laughter.] I do not see, if the National Board sent a gentleman to investigate this thing, what he could possibly find out; nor do I see, that if he should find out the whole history of the matter and report it, that the question would be in any different position from what it is at present. I therefore move, Mr. President, to lay the resolutions on the table."

Dr. DEVRON of Louisiana (New Orleans). — "I ask that Dr. Sternberg be allowed to withdraw the motion himself."

Dr. STERNBERG. — "I have already withdrawn it."

Dr. BILLINGS. — "I had not an opportunity to make a speech on yellow fever, and I seized the only chance I had."

The PRESIDENT. — "I desire to return thanks in behalf of the Executive Committee, and personally to the members of the Association, for the order which has been kept during this meeting of the Association, and the cordial aid and support which has been given to the chairman in his efforts to keep business on schedule time. We have failed a little: but, upon the whole, I think we may be well satisfied with the results of the meeting; and I think, when we get the volume of its transactions published and placed in the hands of those present, they will find it a very pleasant *souvenir*.

"I wish also, having in mind my own experience for several years as a member of the Executive Committee and an officer of the Association, to say a word in behalf of those who are about to assume the duties for the next year. Endeavor to facilitate their work by notifying them early as to the papers which you intend to present. There will always be more or less dissatisfaction with the Executive Committee. There will always be gentlemen whose papers will be crowded out. The purpose of the Executive Committee

in this Association is to keep all business out of the Association as far as possible. I have heard it stated that the Executive Committee is a close corporation, and does not allow the Association to manage its own business. It does not. That is what the Executive Committee was created for. This body is for scientific purposes and the discussion of the papers presented, and not for the taking up of local quarrels or grievances, or the doing of any business of any kind that can be done by the Executive Committee. You must have somebody who will be responsible, and shut out the mass of matter that would otherwise be put upon you. Renewing my thanks personally, and in behalf of the committee, I declare this meeting of the Association adjourned.

TREASURER AND AUDITOR'S REPORT.

LIST OF

OFFICERS, COMMITTEES, AND MEMBERS.

ANNUAL REPORT OF Dr. J. BERRIEN LINDSLEY,

NASHVILLE, TENN.,

Treasurer of the American Public Health Association, Dec. 7, 1880.

RECEIPTS.

Received from Dr. T. J. Turner, Treasurer *pro tem.* . .	$966.26
Received from Dr. H. B. Baker, former Treasurer . . .	1,401.30
Received from sale of "Public Health"	205.40
Received for dues from members, as per lists in my hands, and per Treasurer's book	1,050.00
	$3,622.96

DISBURSEMENTS.

Paid for stationery, printing, and other office expenses of Secretary and Treasurer	$155.22
Paid to the Secretary	100.00
Paid for printing and binding Volume IV.	1,401.00
Paid for printing and binding Volume V.	1,261.74
Cash on hand	705.00
	$3,622.96

The above expenditures were ordered by the Executive Committee, and vouchers for the same are herewith submitted.

(Signed) J. Berrien Lindsley, *Treasurer.*

Approved by Auditing Committee Dec. 8, 1881.

(Signed) J. D. Plunket, M.D., *Chairman.*

OFFICERS AND COMMITTEES

OF

THE AMERICAN PUBLIC HEALTH ASSOCIATION.

PRESIDENT.

Dr. CHARLES B. WHITE of New Orleans, La.

FIRST VICE-PRESIDENT.

Dr. R. C. KEDZIE of Lansing, Mich.

SECOND VICE-PRESIDENT.

Dr. HENRY F. CAMPBELL of Augusta, Ga.

SECRETARY (*for three years*).

Dr. AZEL AMES, Jr., of Wakefield, Mass.

TREASURER.

Dr. J. BERRIEN LINDSLEY of Nashville, Tenn.

STANDING COMMITTEES.

EXECUTIVE COMMITTEE.

Dr. D. C. Holliday, New Orleans, La.
Dr. E. M. Hunt, Metuchen, N.J.
Dr. George M. Sternberg, U.S.A.
Dr. E. L. Griffin, Fond du Lac, Wis.
Dr. J. G. Thomas, Savannah, Ga.
Dr. Thomas F. Wood, Wilmington, N.C.

ADVISORY COUNCIL.

Dr. R. D. Webb, Livingston, Ala.
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Dr. William H. Elliott, Savannah, Ga.
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Dr. Wirt Johnson, Jackson, Miss.
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Dr. James A. Steuart, Baltimore, Md.
Dr. Robert T. Davis, Fall River, Mass.

Dr. HENRY HARTSHORN, Philadelphia, Pa.
Dr. T. C. MINOR, Cincinnati, O.
Dr. GEORGE HOMAN, St. Louis, Mo.
Dr. E. M. SNOW, Providence, R.I.
Hon. JOHN JOHNSON, Memphis, Tenn.
Dr. J. G. CABELL, Richmond, Va.
Dr. H. B. BAKER, Lansing, Mich.
Dr. W. S. ROBERTSON, Muscatine, Ia.
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Dr. SMITH TOWNSHEND, Washington, D.C.
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Dr. T. F. WOOD, Wilmington, N.C.
Dr. H. D. FRASER, Charleston, S.C.
Dr. C. W. CHAMBERLAIN, Hartford, Conn.
Dr. G. P. CONN, Concord, N.H.
Dr. H. D. HOLTON, Brattleborough, Vt.
Dr. J. H. POPE, Marshall, Tex.
Dr. J. T. REEVE, Appleton, Wis.
Dr. C. N. HEWITT, Red Wing, Minn.
Dr. D. C. ENGLISH, New Brunswick, N.J.
Dr. A. L. BREYSACKER, Little Rock, Ark.
Dr. PINCKNEY THOMPSON, Henderson, Ky.
Dr. L. P. BUSH, Wilmington, Del.
Dr. JOS. R. SMITH, U.S.A., San Antonio, Tex.
Dr. A. L. GIHON, U.S.N., Washington, D.C.
Hon. JOHN EATON, Washington, D.C.
Dr. P. H. BAILHACHE, U.S.M.H.S., Washington, D.C.
Dr. STEPHEN SMITH, New York City.

PUBLICATION COMMITTEE.

Dr. AZEL AMES, JR., Wakefield, Mass.
Dr. E. M. HUNT, Metuchen, N.J.
Dr. R. T. DAVIS, Fall River, Mass.

SPECIAL COMMITTEES.

COMMITTEE ON PREVENTION OF VENEREAL DISEASES.

Dr A. L. GIHON, U.S.N., Washington, D.C.
Dr. A. M. KELLER, Hot Springs, Ark.
Dr. GEORGE M. STERNBERG, U.S.A., Washington, D.C.
Dr. D. C. HOLLIDAY, New Orleans, La.
Dr. P. H. BAILHACHE, Washington, D.C.
Dr. JOHN MORRIS, Baltimore, Md.

COMMITTEE ON MANAGEMENT OF EPIDEMICS.

W. T. WALTHALL, Esq., Mobile, Ala.
Dr. JOHN JOHNSON, Memphis, Tenn.
Dr. G. A. KETCHUM, Mobile, Ala.
Hon. JOHN EATON, Washington, D.C.
Dr. J. S. BILLINGS, U.S.A., Washington, D.C.
Dr. H. B. HORLBECK, Charleston, S.C.

COMMITTEE ON STATISTICS.

Dr. ELISHA HARRIS, Albany, N.Y.
Dr. E. M. SNOW, Providence, R.I.
Dr. E. M. HUNT, Metuchen, N.J.

LIST OF MEMBERS

ELECTED AT THE EIGHTH ANNUAL MEETING, NEW ORLEANS, LA., DEC. 7–10, 1880.

Dr. C. A. Abernathy, Pulaski, Tenn.
Dr. F. W. Achilles, Evansville, Ind.
Dr. M. K. Allen, Louisville, Ky.
Dr. T. J. Allen, Shreveport, La.
Dr. Walter Alden, St. Louis, Mo.
Dr. W. N. Ames, Starkville, Miss.
Dr. Edmund Andrews, Chicago, Ill.
Dr. Wm. H. Anderson, Mobile, Ala.
Dr. W. W. Ashton, Shreveport, La.
Dr. H. W. Austine, New Orleans, La.
William Aubrey, Marshall, Tex.
Dr. W. T. Balfour, Vicksburg, Miss.
Dr. B. J. Baldwin, Louisville, Ky.
Dr. D. Barrow, New Orleans, La.
Dr. T. G. Birchett, Vicksburg, Miss.
Dr. R. H. L. Bibb, Austin, Tex.
Dr. J. H. Blanks, Meridian, Miss.
Dr. C. J. Bickham, New Orleans, La.
Dr. F. N. Blount, Pensacola, Fla.
Dr. Henry Bonnabel, New Orleans, La.
Dr. M. R. Brown, Galveston, Tex.
Dr. A. P. Brown, Jefferson, Tex.
Hon. Erastus Brooks, Richmond, N.Y.
Dr. J. D. Bruns, New Orleans, La.
Dr. J. J. Burroughs, Houston, Tex.
S. H. Brooks, Memphis, Tenn.
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M. Burke, Memphis, Tenn.
Dr. John S. Butler, Hartford, Conn.
Cyrus Bussey, New Orleans, La.
Dr. Walter Byrne, Russellville, Ky.
J. W. Caldwell, Memphis, Tenn.
Dr. P. S. Carrington, New Orleans, La.
Dr. J. L. Carter, Dallas, Tex.
Dr. Charles C. Carter, Rock Island, Ill.
Henry Carse, Rock Island, Ill.
Dr. W. W. Cantwell, Davenport, Io.
Dr. J. Y. Cantwell, Mansfield, O.
T. G. Chambers, Charleston, Ill.
Dr. C. B. Chinn, Frankfort, Ky.
Dr. J. H. Claiborne, Petersburg, Va.
Dr. F. H. Clarke, Hopkinsville, Ky.
Dr. A. G. Clopton, Jefferson, Tex.
Dr. S. V. Clevenger, Chicago, Ill.
Dr. T. C. Coleman, Philadelphia, Penn.
Dr. J. R. Colburn, Little Rock, Ark.
James L. Cooper, Huntsville, Ala.
Robert A. Craig, Dayton, O.
Dr. G. G. Craig, Rock Island, Ill.
Dr. Isaac L. Crawcour, New Orleans, La.
Dr. J. B. Cummings, Forest City, Ark.
Dr. R. T. Davis, Fall River, Mass.
Dr. F. E. Daniel, Jackson, Miss.
Dr. D. O. Dean, St. Louis, Mo.
Dr. S. S. De Verry, Chicago, Ill.
Dr. Oscar DeWolf, Chicago, Ill.
Dr. Savage Delavan, Albany, N.Y.
J. A. Denie, Memphis, Tenn.
Dr. John S. Douglas, Jackson, Tenn.
Dr. John E. Duffel, Donaldsonville, La.
Dr. T. C. Duncan, Chicago, Ill.
Theodore Engelbach, New Orleans, La.
Hon. L. B. Eaton, Memphis, Tenn.
Thomas S. Elder, New Orleans, La.
Dr. John B. Elliott, Sewanee, Tenn.
Dr. Albert R. Erskine, Huntsville, Ala.
Dr. S. T. Evans, Union City, Tenn.
J. T. Fargason, Memphis, Tenn.
Dr. Henry C. Fairbank, Flint, Mich.
Dr. John A. G. Fisher, New Orleans, La.
Dr. J. D. Fields, Manor, Tex.
Dr. Joseph C. Ficklin, Paris, Ill.
Henry Flad, C.E., St. Louis, Mo.
H. L. Fletcher, Little Rock, Ark.
Theobold Forstall, New Orleans, La.
Dr. F. Formento, New Orleans, La.
N. Fontaine, Memphis, Tenn.
Dr. W. F. Fordhan, Pensacola, Fla.

D. R. Fox, Plaquemine, La.
A. B. Farquhar, York, Penn.
A. J. Fryer, Charleston, Ill.
Dr. A. G. Friedrichs, New Orleans, La.
W. S. Gale, Galesburg, Ill.
Prof. John Gamgee, Washington, D.C.
J. W. Gaut, Knoxville, Tenn.
John Gaston, Memphis, Tenn.
Thomas Gale, Memphis, Tenn.
James Gallatin, New York City.
Dr. Thomas Galt, Rock Island, Ill.
Wm. Paul Gerhard, C.E., Newport, R.I.
John R. Godwin, Memphis, Tenn.
J. M. Goodbar, Memphis, Tenn.
W. W. Goodwin, Memphis, Tenn.
Hon. J. W. Gore, Jackson, Tenn.
Colton Green, Memphis, Tenn.
Dr. B. M. Griffith, Springfield, Ill.
A. D. Gwynn, Memphis, Tenn.
T. J. Hale, Galesburg, Ill.
D. P. Haddin, Memphis, Tenn.
L. Hananer, Memphis, Tenn.
Dr. G. A. B. Hays, Happy Jack, La.
B. M. Harrod, C.E., New Orleans, La.
Dr. W. H. Halcombe, New Orleans, La.
Dr. J. M. Hall, Chicago, Ill.
Dr. John J. Hayes, New Orleans, La.
Dr. John B. Henderson, New Orleans, La.
John C. Henderson, New Orleans, La.
Dr. S. L. Henry, Carrollton, La.
Dr. D. C. Hewsen, Orange, Tex.
Dr. W. G. Hillis, Keokuk, Ia.
Dr. D. B. Hillis, Keokuk, Ia.
Hon. I. M. Hill, Memphis, Tenn.
Dr. W. H. Hire, New Orleans, La.
Dr. H. B. Horlbeck, Charleston, S.C.
Dr. Joseph Holt, New Orleans, La.
C. W. Hutchison, Charleston, Ill.
Dr. James G. Hunt, Utica, N.Y.
Rev. E. E. Hoss, Abingdon, Va.
Dr. David Jamison, New Orleans, La.
William Henry James, Philadelphia, Penn.
Dr. J. D. Jarratt, Smyrna, Tex.
Dr. H. S. Jewett, Dayton, O.
Dr. H. Isaac Jones, Scranton, Penn.
Charles G. Johnson, New Orleans, La.
Rev. T. G. Jones, D.D., Nashville, Tenn.
N. N. John, Galveston, Tex.
Dr. Joseph Jones, New Orleans, La.
Dr. S. D. Kennedy, New Orleans, La.
Hon. J. M. Keating, Memphis, Tenn.
S. J. Keith, Nashville, Tenn.
Dr. A. R. Kilpatrick, Navasota, Tex.
C. O. Kimball, Little Rock, Ark.
Hon. H. P. Kernochan, Plaquemine, La.
Dr. G. A. Ketchum, Mobile, Ala.
R. P. Lane, Rockford, Ill.
Dr. C. S. Laughlin, Paris, Ill.
L. H. Lanier, Nashville, Tenn.
Dr. C. O. Laugenbecker, New Orleans, La.
Dr. S. H. Lowry, Huntsville, Ala.
Dr. James H. Letcher, Henderson, Ky.
Dr. John Cooper Lee, Blount Springs, Ala.
Dr. F. W. Lester, Key West, Fla.
Dr. Thomas Layton, New Orleans, La.
Dr. J. L. Lyons, New Orleans, La.
Dr. C. L. Lexoux, Pass Christian, Miss.
Dr. Marx Levy, New Orleans, La.
Dr. T. M. Leonard, Pensacola, Fla.
Dr. Joseph R. Lemen, St. Louis, Mo.
Hon. A. V. S. Lindsley, Nashville, Tenn.
Dr. Edward Linthieurn, Evansville, Ind.
Dr. C. T. Lichtenberger, Eureka, Ill.
Dr. Frederick Loeber, New Orleans, La.
H. A. La Fetra, Brooklyn, N.Y.
Dr. J. M. Locke, Lynnville, Tenn.
Dr. Samuel Logan, New Orleans, La.
Dr. J. R. Luten, Fulton, Ky.
Dr. Robert Luedeking, St. Louis, Mo.
Dr. Joseph L. Maus, Peoria, Ill.
I. N. Marks, New Orleans, La.
Dr. William Martin, New Orleans, La.
F. Maura, Pensacola, Fla.
Dr. R. Matas, New Orleans, La.
Dr. William Massie, Paris, Ill.
W. A. Malin, Austin, Tex.
Dr. P. J. McCormack, Yazoo City, Miss.
Dr. P. D. McCulloch, Hot Springs, Ark.
Dr. R. B. McCleary, Monmouth, Ill.
Dr. J. C. McGinn, Washington, D.C.
Dr. P. B. McCutcheon, New Orleans, La.
Dr. J. J. Mellon, New Orleans, La.
Dr. John A. Mead, Pearlington, Miss.
M. L. Meacham, Memphis, Tenn.
Dr. A. J. Miles, Cincinnati, O.
Dr. Wm. S. Mitchell, New Orleans, La.
Dr. R. F. Michel, Montgomery, Ala.
Dr. E. J. Mioton, New Orleans, La.
Dr. A. J. Miller, Paris, Ill.
Dr. J. L. Million, Springfield, Ill.
Robert Moore, C.E., St. Louis, Mo.
Hon. William R. Moore, Memphis, Tenn.
Rev. James Morrow, Philadelphia, Penn.
Dr. H. W. Moore, Sadlersville, Tenn.
Dr. G. A. Moses, St. Louis, Mo.
Dr. J. N. McCormack, Bowling Green, Ky.
Dr. J. W. Morey, Moline, Ill.
Dr. D. G. Murrel, Louisville, Ky.

Dr. T. Nagel, New Orleans, La.
Dr. L. G. Noel, Nashville, Tenn.
Dr. J. N. Nuttall, Memphis, Tenn.
J. T. O'Pry, New Orleans, La.
Dr. B. F. O'Daniel, Brunswick, Tenn.
Dr. John Del Orto, New Orleans, La.
John Overton, Jr., Memphis, Tenn.
Dr. F. W. Parham, New Orleans, La.
Dr. W. R. Patton, Charleston, Ill.
Dr. E. D. Peete, Humboldt, Tenn.
Dr. D. L. Pharez, Starkville, Miss.
Dr. J. G. Pinkham, Lynn, Mass.
Dr. W. P. Powell, Willis, Tex.
Dr .F. Peyre Porcher, Charleston, S.C.
Dr. David Prince, Jacksonville, Ill.
Dr. George E. Ranney, Lansing, Mich.
Dr. F. G. Renshaw, Pensacola, Fla.
Dr. C. A. Rice, Vicksburg, Miss.
H. B. Richardson, C.E., New Orleans, La.
Dr. M. R. Richard, New Orleans, La.
Dr. John L. Rison, Huntsville, Ala.
Dr. T. G. T. Richardson, New Orleans, La.
Dr. S. S. Reeves, Franklin, Miss.
Dr. Hillary Ryan, Caldwell, Tex.
Dr. W. S. Robertson, Muscatine, Ia.
Dr. A. T. Robertson, Ashmore, Ill.
Dr. James Rodgers, Knoxville, Tenn.
Dr. A. W. Roaldes, New Orleans, La.
Dr. George H. Rohe, Baltimore, Md.
Howard Ross, Chicago, Ill.
Dr. Moses T. Runnels, Indianapolis, Ind.
Dr. W. E. Saunders, Austin, Tex.
Dr. E. P. Sale, Aberdeen, Miss.
Dr. William M. Smith, Stapleton, N.Y.
Dr. T. S. Scales, Mobile, Ala.
Fred. E. Schuniding, St. Louis, Mo.
Dr. John G. Scarborough, Little Rock, Ark.
Dr. Joseph T. Scott, New Orleans, La.
Dr. A. R. Small, Decatur, Ill.
Dr. D. S. Smith, Chicago, Ill.
George Soule, New Orleans, La.
A. W. Soper, St. Louis, Mo.
Dr. John J. Speed, Louisville, Ky.
Dr. Joseph Spiegelhalter, St. Louis, Mo.
Dr. E. T. Shaphard, New Orleans, La.
Dr. G. S. Smith, Pass Christian, Miss.
L. T. Stone, Galesburg, Ill.
Dr. Warren Stone, New Orleans, La.
Dr. Horatio R. Storer, Newport, R.I.
Dr. R. M. Swearingen, Austin City, Tex.
Dr. R. P. Tallry, Belton, Tex.
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Mrs. C. M. Tadlock, Knoxville, Tenn.
Dr. C. H. Tebault, New Orleans, La.
Dr. John Tenbrook, Paris, Ill.
Dr. Charles A. Todd, St. Louis, Mo.
W. T. Van Kirk, Janesville, Wis.
Dr. Paul Von Seydenwitz, New Orleans, La.
A. Vaccaro, Memphis, Tenn.
Dr. T. S. Verdi, Washington, D.C.
Dr. W. H. Watkins, New Orleans, La.
Robert H. Watkins, Nashville, Tenn.
W. E. Ward, D.D., Nashville, Tenn.
J. R. Walker, D.D.S., New Orleans, La.
Dr. Henry P. Walcott, Cambridge, Mass.
Dr. James H. Wellings, Lansing, Mich.
Dr. J. A. White, New Waverly, Tex.
Mrs. S. R. Williams, Chapel Hill, Tex.
Dr. O. L. Williams, Chapel Hill, Tex.
E. P. Williams, Galesburg, Ill.
Dr. W. H. Wilson, Weldon, Tex.
Dr. W. E. Wiegand, Baltimore, Md.
F. A. Woolfley, New Orleans, La.
Thomas J. Woodward, New Orleans, La.
Dr. T. D. Wooten, Austin, Tex.

REVISED LIST OF MEMBERS.

AMERICAN PUBLIC HEALTH ASSOCIATION.

Dr. C. A. Abernathy	Pulaski, Tenn.	1880.
Dr. F. W. Achilles	Evansville, Ind.	1880.
A. G. Adams	Nashville, Tenn.	1879.
Dr. Daniel W. Adams	New Orleans, La.	1878.
Dr. C. R. Agnew	New York City.	1872.
Dr. Walter Alden	St. Louis, Mo.	1880.
Geo. W. Allen	Richmond, Va.	1878.
Dr. M. K. Allen	Louisville, Ky.	1880.
Dr. Nathan Allen	Lowell, Mass.	1873.
Dr. T. J. Allen	Shreveport, La.	1880.
Dr. Azel Ames, Jr.	Wakefield, Mass.	1875.
Dr. W. N. Ames	Starkville, Miss.	1880.
Dr. William H. Anderson	Mobile, Ala.	1880.
Dr. George L. Andrew	La Porte, Ind.	1877.
Dr. E. C. Angell	New York City.	1878.
George T. Angell	Boston, Mass.	1878.
Rev. J. G. Armstrong	Richmond, Va.	1878.
Dr. W. W. Ashton	Shreveport, La.	1880.
Dr. T. A. Atchison	Nashville, Tenn.	1878.
Dr. W. A. Atchison	Nashville, Tenn.	1879.
William Aubrey	Marshall, Tex.	1880.
Dr. Charles Aurbrook	Boulder, Col.	1878.
Dr. H. W. Austine	New Orleans, La.	1880.
Dr. W. G. Austin	New Orleans, La.	1878.
Dr. William Bailey	Louisville, Ky.	1879.
Dr. P. H. Bailhache	Washington, D.C.	1874.
Dr. H. B. Baker	Lansing, Mich.	1873.
Dr. G. B. Balch	Yonkers, N.Y.	1874.
Dr. M. C. Baldridge	Huntsville, Ala.	1878.
Dr. B. J. Baldwin	Louisville, Ky.	1880.
Dr. W. P. Balfour	Vicksburg, Miss.	1880.
Gen. Joseph K. Barnes, M.D.	Surgeon-General U.S.A.	1874.
Dr. G. W. Barr		1879.
Dr. W. F. Barr	Abingdon, Va.	1879.
Dr. D. Barrow	New Orleans, La.	1880.
Dr. J. H. Bartholomew	Lansing, Mich.	1879.
Dr. H. W. Bassett	Huntsville, Ala.	1879.
Dr. G. A. Baxter	Chattanooga, Tenn.	1879.

Dr. W. H. Beatty	Mobile, Ala.	1878.
Dr. A. N. Bell	Garden City, N.Y.	1872.
Prof. S. M. Bemiss, M.D.	New Orleans, La.	1878.
Dr. Thomas J. Bennett	Smyrna, Tenn.	1879.
C. D. Berry	Nashville, Tenn.	1879.
Dr. R. H. L. Bibb	Austin, Tex.	1880.
Dr. C. J. Bickham	New Orleans, La.	1880.
Dr. John S. Billings, U.S.A.	Washington, D.C.	1872.
Dr. John E. Bingham	Walla Walla, W.T.	1878.
Gen. James Bintliff	Darlington, Wis.	1878.
Dr. T. G. Birchett	Vicksburg, Miss.	1880.
Dr. George S. Blackie	Nashville, Tenn.	1879.
Dr. Emily Blackwell	New York City.	1873.
Dr. J. H. Blanks	Meridian, Miss.	1880.
Dr. J. C. Blanton	New Market, Ala.	1879.
E. W. Blatchford	Chicago, Ill.	1876.
Dr. John M. Bloss	Evansville, Ind.	1879.
Dr. F. N. Blount	Pensacola, Fla.	1880.
Dr. Henry Bonnabel	New Orleans, La.	1880.
Dr. Henry I. Bowditch	Boston, Mass.	1876.
Prof. Cyrus F. Brackett	Princeton, N.J.	1877.
Prof. William H. Brewer	New Haven, Conn.	1874.
Dr. W. P. Brewer	New Orleans, La.	1879.
Dr. A. L. Breysacher	Little Rock, Ark.	1879.
Dr. William Brodie	Detroit, Mich.	1873.
Hon. F. J. Bromberg	Mobile, Ala.	1878.
Hon. Erastus Brooks	Richmond, N.Y.	1880.
S. H. Brooks	Memphis, Tenn.	1880.
Dr. A. P. Brown	Jefferson, Tex.	1880.
Maj. John L. Brown	Nashville, Tenn.	1879.
Dr. M. R. Brown	Galveston, Tex.	1880.
Dr. J. D. Bruns	New Orleans, La.	1880.
H. B. Buckner	Nashville, Tenn.	1879.
Dr. John R. Buist	Nashville, Tenn.	1879.
Dr. J. S. Buist	Charleston, S.C.	1879.
Hon. E. A. Burke	New Orleans, La.	1880.
M. Burke	Memphis, Tenn.	1880.
Dr. J. J. Burroughs	Houston, Tex.	1880.
Gen. Cyrus Bussey	New Orleans, La.	1880.
Dr. L. P. Bush	Wilmington, Del.	1879.
Dr. John S. Butler	Hartford, Conn.	1880.
Dr. Walter Byrne	Russellville, Ky.	1880.
Dr. J. Grattan Cabell	Richmond, Va.	1873.
Prof. J. L. Cabell, M.D.	Charlottesville, Va.	1872.
J. W. Caldwell	Memphis, Tenn.	1880.
Alexander Cameron	Richmond, Va.	1878.
Col. John F. Cameron	Memphis, Tenn.	1879.
Prof. Henry F. Campbell, M.D.	Augusta, Ga.	1879.
Dr. W. A. Cantrell	Little Rock, Ark.	1879.
Dr. J. Y. Cantwell	Mansfield, O.	1880.

Dr. W. W. Cantwell	Davenport, Ia.	1880.
J. L. Carrington	Richmond, Va.	1878.
Dr. Paul S. Carrington	Quarantine Station, Mississippi River.	1878.
Henry Carse	Rock Island, Ill.	1880.
Dr. Charles C. Carter	Rock Island, Ill.	1880.
Dr. J. L. Carter	Dallas, Tex.	1880.
Dr. H. P. Cartwright	Rich Pond, Ky.	1879.
Prof. Stanford E. Chaillé, M.D.	New Orleans, La.	1874.
Dr. C. W. Chamberlain	Hartford, Conn.	1878.
T. G. Chambers	Charleston, Ill.	1880.
Dr. C. W. Chancellor	Baltimore, Md.	1875.
Prof. C. F. Chandler	New York City.	1872.
Dr. William F. Channing	Providence, R.I.	1876.
Dr. Richard Cheatham	Nashville, Tenn.	1879.
E. S. Chesborough, C.E.	Chicago, Ill.	1875.
Rev. J. B. Chevis, D.D.	Nashville, Tenn.	1879.
Dr. C. B. Chinn	Frankfort, Ky.	1880.
Dr. J. H. Claiborne	Petersburg, Va.	1880.
Hon. J. W. Clapp	Memphis, Tenn.	1879.
Dr. Anson L. Clark	Elgin, Ill.	1877.
Dr. F. H. Clarke	Hopkinsville, Ky.	1880.
Dr. William M. Clark	Nashville, Tenn.	1879.
Dr. H. H. Clayton	Murfreesborough, Tenn.	1879.
Dr. William Clendenin	Cincinnati, O.	1872.
Dr. S. V. Clevenger	Chicago, Ill.	1880.
Dr. A. G. Clopton	Jefferson, Tex.	1880.
Hon. S. C. Cobb	Pensacola, Fla.	1879.
Dr. Jerome Cochran	Mobile, Ala.	1872.
Dr. Bela Coggshall	Flint, Mich.	1879.
Dr. J. R. Colburn	Little Rock, Ark.	1880.
E. W. Cole	Nashville, Tenn.	1879.
Dr. T. C. Coleman	Philadelphia, Penn.	1880.
Dr. S. H. Collins	Memphis, Tenn.	1879.
Dr. J. W. Compton	Evansville, Ind.	1879.
Dr. S. P. Conn	Concord, N.H.	1875.
Dr. W. C. Cook	Nashville, Tenn.	1879.
James L. Cooper	Huntsville, Ala.	1880.
Hon. W. F. Cooper	Nashville, Tenn.	1879.
Dr. J. S. Copes	New Orleans, La.	1878.
R. S. Cowan	Nashville, Tenn.	1879.
Robert A. Craig	Dayton, O.	1880.
Dr. G. G. Craig	Rock Island, Ill.	1880.
Dr. Charles H. Crane	Washington, D.C.	1874.
Dr. James Crane	Brooklyn, N.Y.	1877.
Dr. Isaac L. Crawcour	New Orleans, La.	1880.
J. James R. Croes, C.E.	Yonkers, N.Y.	1877.
Dr. J. B. Cummings	Forest City, Ark.	1880.
Prof. Francis D. Cunningham, M.D.	Richmond, Va.	1876.
S. A. Cunningham	Cartersville, Ga.	1879.
Gen. John M. Cuyler, M.D.	New York City.	1873.

Dr. Gustavus Devron	New Orleans, La.	1878.
Dr. Jacob M. Da Costa	Philadelphia, Penn.	1874.
Dr. J. P. Dake	Nashville, Tenn.	1879.
Dr. F. E. Daniel	Jackson, Miss.	1880.
Dr. James G. Darrach	Germantown, Penn.	1874.
Dr. J. P. Davidson	New Orleans, La.	1879.
Dr. Francis Davis	Chicago, Ill.	1877.
Joseph P. Davis, C.E.	Boston, Mass.	1876.
Prof. J. S. Davis, M.D.	University of Virginia, Va.	1878.
Dr. J. W. Davis	Smyrna, Tenn.	1879.
Dr. M. M. Davis	Baraboo, Wis.	1877.
Prof. N. S. Davis, M.D	Chicago, Ill.	1873.
Dr. R. T. Davis	Fall River, Mass.	1880.
Dr. Walter De Forest Day	New York City.	1873.
Dr. D. O. Dean	St. Louis, Mo.	1880.
T. R. Deason	Trenton, Tenn.	1879.
Dr. Savage Delavan	Albany, N.Y.	1880.
Dr. J. J. Dement	Huntsville, Ala.	1878.
J. A. Denie	Memphis, Tenn.	1880.
Dr. Laban Dennis	Newark, N.J.	1877.
Dr. S. C. De Verry	Chicago, Ill.	1880.
William E. Dodge, Jr.	New York City.	1874.
Prof. Frank Donaldson	Baltimore, Md.	1875.
Dr. R. W. Dorsey	Fairfax C. H., Va.	1879.
Dr. John S. Douglas	Jackson, Tenn.	1880.
Dr. Greensville Dowell	Galveston, Tex.	1878.
Dr. E. L. Drake	Nashville, Tenn.	1879.
Dr. John A. Draughon	Nashville, Tenn.	1879.
Dr. Abram Dubois	New York City.	1874.
Dr. J. W. Dupree	Baton Rouge, La.	1878.
Dr. John E. Duffel	Donaldsonville, La.	1880.
Dr. T. C. Duncan	Chicago, Ill.	1880.
Dr. D. H. Dungan	Little Rock, Ark.	1874.
Dr. R. W. Dunlap	Danville, Ky.	1879.
Dr. T. J. Dunott	Harrisburg, Penn.	1874.
Dr. S. H. Durgin	Boston, Mass.	1875.
Dr. Oscar De Wolf	Chicago, Ill.	1880.
Hon. L. B. Eaton	Memphis, Tenn.	1880.
Dr. O. R. Early	Columbus, Ky.	1879.
Dr. Landon B. Edwards	Richmond, Va.	1878.
Thomas S. Elder	New Orleans, La.	1880.
Dr. John B. Elliott	Sewanee, Tenn.	1880.
Dr. William H. Elliott	Savannah, Ga.	1878.
Theodore Engelbach	New Orleans, La.	1880.
Dr. George Engs	Newport, R.I.	1876.
Dr. Albert R. Erskine	Huntsville, Ala.	1880.
A. J. Erwin	Mansfield, O.	1879.
Dr. R. F. Evans	Shelbyville, Tenn.	1879.
Dr. S. T. Evans	Union City, Tenn.	1880.
Dr. Duncan Eve	Nashville, Tenn.	1879.

Dr. Henry C. Fairbank	Flint, Mich.	1880.
J. Horton Fall	Nashville, Tenn.	1879.
J. T. Fargason	Memphis, Tenn.	1880.
Dr. A. M. Fauntleroy	Staunton, Va.	1878.
Dr. John Faville	Madison, Wis.	1876.
A. B. Farquhar	York, Penn.	1880.
Edward Fenner	New Orleans, La.	1879.
Dr. Joseph C. Ficklin	Paris, Ill.	1880.
Dr. J. D. Fields	Manor, Tex.	1880.
Dr. Emil Fischer	Philadelphia, Penn.	1874.
Dr. John A. G. Fisher	New Orleans, La.	1880.
L. C. Fisher	Galveston, Tex.	1878.
Dr. C. C. Fite	Shelbyville, Tenn.	1879.
Dr. T. L. Fite	Lebanon, Tenn.	1879.
Henry Flad, C.E.	St. Louis, Mo.	1880.
H. L. Fletcher	Little Rock, Ark.	1880.
Prof. Austin Flint, M.D.	New York City.	1873.
N. Fontaine	Memphis, Tenn.	1880.
Dr. G. W. Foote	Galesburg, Ill.	1877.
Dr. William H. Ford	Philadelphia, Penn.	1874.
Dr. W. F. Fordham	Pensacola, Fla.	1880.
Dr. F. Formento	New Orleans, La.	1880.
Theobold Forstall	New Orleans, La.	1880
D. R. Fox	Plaquemine, La.	1880.
E. W. Franklin	Mitchellville, Tenn.	1879.
Dr. H. D. Fraser	Charleston, S.C.	1879.
Dr. George F. French	Minneapolis, Minn.	1875.
Dr. A. G. Friedrichs	New Orleans, La.	1880.
A. G. Fryer	Charleston, Ill.	1880.
Dr. R. W. Gaines	Hopkinsville, Ky.	1879.
Thomas Gale	Memphis, Tenn.	1880.
W. S. Gale	Galesburg, Ill.	1880.
Dr. J. D. Galt	Norfolk, Va.	1878.
Dr. Thomas Galt	Rock Island, Ill.	1880.
Dr. W. H. Galt	Louisville, Ky.	1879.
Prof. James T. Gardner	Albany, N.Y.	1875.
John Gaston	Memphis, Tenn.	1880.
Dr. John B. Gaston	Montgomery, Ala.	1878.
Dr. J. D. Gatch	Lawrenceburg, Ind.	1879.
J. W. Gaut	Knoxville, Tenn.	1880.
Prof. John Gamgee	Washington, D.C.	1880.
William Paul Gerhard, C.E.	Newport, R.I.	1880.
Dr. B. F. Gibbs, U.S.N	Washington, D.C.	1879.
Prof. Wolcott Gibbs	Cambridge, Mass.	1876.
Dr. A. L. Gihon, U.S.N.	Washington, D.C.	1876.
Prof. Daniel C. Gilman	Baltimore, Md.	1873.
Dr. John T. Gilman	Portland, Me.	1873.
Dr. J. H. Gilmore	New York City.	1878.
Dr. Alfred C. Girard	Fort Keogh, Mon. Ter.	1874.
James Gallatin	New York City.	1880.

A. D. Gwynn	Memphis, Tenn.	1880.
Dr. William C. W. Glazier	Key West, Fla.	1878.
Dr. William F. Glenn	Nashville, Tenn.	1879.
John R. Godwin	Memphis, Tenn.	1880.
J. M. Goodbar	Memphis, Tenn.	1880.
W. W. Goodwin	Memphis, Tenn.	1880.
W. A. Goodwyn	Nashville, Tenn.	1879.
Hon. J. W. Gore	Jackson, Tenn.	1880.
Dr. Gabriel Grant	New York City.	1873.
Dr. J. F. Grant	Nashville, Tenn.	1879.
Dr. John P. Gray	Utica, N.Y.	1873.
Gen. Colton Green	Memphis, Tenn.	1880.
J. M. Gregory, L.L.D.	Champaign, Ill.	1877.
Dr. E. L. Griffin	Fond du Lac, Wis.	1876.
Dr. B. M. Griffith	Springfield, Ill.	1880.
Dr. W. E. Griffiths	Brooklyn, N.Y.	1879.
Prof. S. D. Gross, M.D.	Philadelphia, Penn.	1874.
Dr. Desault Guernsey	Amenia, N.Y.	1873.
Dr. N. L. Guice	Fayette, Miss.	1878.
Dr. Richard Gundry	Catonsville, Md.	1878.
D. P. Haddin	Memphis, Tenn.	1880.
Dr. W. H. Halcombe	New Orleans, La.	1880.
T. J. Hale	Galesburg, Ill.	1880.
Dr. J. M. Hall	Chicago, Ill.	1880.
L. Hananer	Memphis, Tenn.	1880.
Dr. D. W. Hand	St. Paul, Minn.	1878.
R. A. Hardin	Savannah, Tenn.	1879.
Dr. J. M. Harding	Nashville, Tenn.	1879.
Dr. R. B. S. Hargis	Pensacola, Fla.	1878.
Dr. Elisha Harris	New York City.	1872.
Dr. J. E. Harris	Nashville, Tenn.	1879.
Prof. J. F. Harrison	University of Virginia, Va.	1878.
Maj. B. M. Harrod, C.E.	New Orleans, La.	1880.
Dr. Henry Hartshorne	Philadelphia, Penn.	1872.
Dr. J. R. Harwell	Nashville, Tenn.	1879.
Dr. Thomas Hay	Philadelphia, Penn.	1874.
Dr. John J. Hayes	New Orleans, La.	1880.
Dr. G. A. B. Hays	Happy Jack, La.	1880.
Dr. John B. Henderson	New Orleans, La.	1880.
John C. Henderson	New Orleans, La.	1880.
Dr. S. L. Henry	Carrollton, La.	1880.
Rudolph Hering, C.E.	Philadelphia, Penn.	1878.
Dr. S. S. Herrick	New Orleans, La.	1878.
Dr. C. N. Hewitt	Red Wing, Minn.	1872.
Dr. D. C. Hewsen	Orange, Tex.	1880.
Dr. Addinell Hewson	Philadelphia, Penn.	1874.
Hon. I. M. Hill	Memphis, Tenn.	1880.
Dr. S. V. D. Hill	Macon, Miss.	1879.
Dr. D. B. Hillis	Keokuk, Ia.	1880.
Dr. W. G. Hillis	Keokuk, Ia.	1880.

Dr. W. H. Hire	New Orleans, La.	1880.
Prof. Edward Hitchcock	Amherst, Mass.	1877.
Dr. H. O. Hitchcock	Kalamazoo, Mich.	1872.
Dr. J. W. Holland	Louisville, Ky.	1879.
Dr. D. C. Holliday	New Orleans, La.	1878.
Dr. Joseph Holt	New Orleans, La.	1880.
Dr. Henry D. Holton	Brattleborough, Vt.	1875.
Dr. George Homan	St. Louis, Mo.	1879.
Dr. W. T. Hope	Chattanooga, Tenn.	1878.
Dr. H. B. Horlbeck	Charleston, S.C.	1880.
Dr. A. A. Horner	Helena, Ark.	1879.
Dr. Asa Horr	Dubuque, Io.	1873.
Rev. E. E. Hoss	Abingdon, Va.	1880.
Dr. E. Lloyd Howard	Baltimore, Md.	1874.
H. M. Hoxie	Palestine, Tex.	1879.
Dr. Ezra M. Hunt	Metuchen, N.J.	1872.
Dr. James G. Hunt	Utica, N.Y.	1880.
C. W. Hutchinson	Charleston, Ill.	1880.
Dr. O. S. Iglehart	Vicksburg, Miss.	1878.
Dr. J. A. Ireland	Louisville, Ky.	1879.
Dr. Bushrod W. James	Philadelphia, Penn.	1878.
Hon. E. A. James	Chattanooga, Tenn.	1879.
William Henry James	Philadelphia, Penn.	1880.
Dr. David Jamison	New Orleans, La.	1880.
Dr. E. H. Janes	New York City.	1872.
Dr. Edward G. Janeway	New York City.	1875.
Dr. J. D. Jarratt	Smyrna, Tenn.	1880.
Dr. J. Foster Jenkins	Yonkers, N.Y.	1875.
Dr. R. G. Jennings	Little Rock, Ark.	1879.
R. W. Jennings	Nashville, Tenn.	1879.
Dr. H. S. Jewett	Dayton, O.	1880.
N. N. John	Galveston, Tex.	1880.
C. A. Johns	New York City.	1879.
Charles G. Johnson	New Orleans, La.	1880.
Dr. Hosmer A. Johnson	Chicago, Ill.	1872.
Hon. John Johnson	Memphis, Tenn.	1879.
Dr. Wirt Johnson	Jackson, Miss.	1878.
Dr. Alfred Jones	Cornersville, Tenn.	1879.
Dr. Heber Jones	Memphis, Tenn.	1878.
Dr. H. G. Jones	Evansville, Ind.	1879.
Dr. H. Isaac Jones	Scranton, Penn.	1880.
Dr. Joseph Jones	New Orleans, La.	1880.
Rev. T. G. Jones, D.D.	Nashville, Tenn.	1879.
Dr. W. P. Jones	Nashville, Tenn.	1879.
C. Jordan	Houston, Tex.	1879.
Dr. L. S. Joynes	Richmond, Va.	1878.
Dr. A. B. Judson	New York City.	1873.
Hon. J. M. Keating	Memphis, Tenn.	1880.
Prof. R. C. Kedzie, M.D.	Lansing, Mich.	1879.
James M. Keith	Boston, Mass.	1879.

S. J. Keith	Nashville, Tenn.	1880.
Dr. J. M. Keller	Hot Springs, Ark.	1879.
Dr. J. H. Kellogg	Battle Creek, Mich.	1878.
Dr. S. D. Kennedy	New Orleans, La.	1880.
Dr. Isaac N. Kerlin	Media, Penn.	1874.
Hon. H. P. Kernochan	Plaquemine, La.	1880.
Prof. W. C. Kerr	Raleigh, N.C.	1874.
Dr. G. A. Ketchum	Mobile, Ala.	1880.
Dr. R. F. Keyes	Nashville, Tenn.	1879.
Dr. A. R. Kilpatrick	Navasota, Tex.	1880.
C. O. Kimball	Little Rock, Ark.	1880.
Francis T. King	Baltimore, Md.	1875.
Dr. R. A. Kinloch	Charleston, S.C.	1878.
H. A. La Fetra	Brooklyn, N.Y.	1880.
Prof. Corydon La Ford, M.D.	Ann Arbor, Mich.	1877.
L. H. Lamer	Nashville, Tenn.	1880.
Moses Lane, C.E.	Milwaukee, Wis.	1877.
R. P. Lane	Rockford, Ill.	1880.
Dr. C. O. Laugenbecker	New Orleans, La.	1880.
Dr. C. S. Laughlin	Paris, Ill.	1880.
Prof. James Law	Ithaca, N.Y.	1872.
Dr. Thomas Layton	New Orleans, La.	1880.
Henry C. Lea	Philadelphia, Penn.	1874.
Dr. Robert Lebby	Charleston, S.C.	1878.
Dr. John Cooper Lee	Blount Springs, Ala.	1880.
Dr. William Lee	Washington, D.C.	1874.
Prof. A. R. Leeds	Hoboken, N.J.	1877.
Dr. J. C. LeHardy	Savannah, Ga.	1879.
Dr. L. Z. Leiter	Chicago, Ill.	1876.
Hon. John Lellyett	Nashville, Tenn.	1879.
Dr. Joseph R. Lemen	St. Louis, Mo.	1880.
Dr. B. B. Lenoir	Lenoirs, Tenn.	1879.
Dr. Frederick D. Lente	New York City.	1874.
Dr. T. M. Leonard	Pensacola, Fla.	1880.
Dr. F. W. Lester	Key West, Fla.	1880.
Dr. James H. Letcher	Henderson, Ky.	1880.
William P. Letchworth	Buffalo, N.Y.	1874.
Dr. H. H. Levy	Richmond, Va.	1878.
Dr. Marx Levy	New Orleans, La.	1880.
Dr. A. D. Lewis	La Grange, Tenn.	1879.
Dr. C. L. Lewis	Nashville, Tenn.	1879.
Dr. Francis W. Lewis	Philadelphia, Penn.	1874.
Dr. C. L. Lexoux	Pass Christian, Miss.	1880.
Prof. A. F. Liautard	New York City.	1872.
Dr. C. T. Lichtenberger	Eureka, Ill.	1880.
William B. Lillard	Detroit, Mich.	1879.
Hon. A. V. S. Lindsley	Nashville, Tenn.	1880.
Prof. C. A. Lindsley, M.D.	New Haven, Conn.	1875.
Dr. J. Berrien Lindsley	Nashville, Tenn.	1877.
Dr. J. M. Lindsley	Pecan Point, Ark.	1879.

Dr. Van S. Lindsley	Nashville, Tenn.	1879.
Dr. Edward Linthieurn	Evansville, Ind.	1880.
Dr. J. M. Locke	Lynnville, Tenn.	1880.
Dr. Frederick Loeber	New Orleans, La.	1880.
Dr. C. A. Logan	Chicago, Ill.	1877.
Dr. Samuel Logan	New Orleans, La.	1880.
W. P. P. Longfellow, C.E.	Cambridge, Mass.	1876.
Dr. Isaac N. Love	St. Louis, Mo.	1879.
Dr. S. H. Lowry	Huntsville, Ala.	1880.
Dr. Robert Luedeking	St. Louis, Mo.	1880.
Prof. N. P. Lupton, LL.D.	Nashville, Tenn.	1879.
Dr. J. R. Luten	Fulton, Ky.	1880.
Dr. J. L. Lyons	New Orleans, La.	1880.
Dr. James B. McCaw	Richmond, Va.	1878.
Dr. R. B. McCleary	Monmouth, Ill.	1880.
M. A McClelland	Knoxville, Ill.	1879.
Dr. J. N. McCormack	Bowling Green, Ky.	1880.
Dr. P. J. McCormack	Yazoo City, Miss.	1880.
Dr. P. D. McCulloch	Hot Springs, Ark.	1880.
Prof. R. S. McCulloch	Baton Rouge, La.	1878.
Dr. P. B. McCutcheon	New Orleans, La.	1880.
John J. McGavock	Nashville, Tenn.	1879.
Dr. J. C. McGinn	Washington, D.C.	1880.
J. P. McGuire	Nashville, Tenn.	1879.
Hon. Albert T. McNeal	Bolivar, Tenn.	1879.
Dr. Thomas A. McParlin, U.S.A.	New York City.	1873.
H. N. McTyeire, D.D.	Nashville, Tenn.	1879.
Prof. T. L. Maddin, M.D.	Nashville, Tenn.	1879.
W. A. Malin	Austin, Tex.	1880.
I. N. Marks	New Orleans, La.	1880.
Dr. Solon Marks	Milwaukee, Wis.	1876.
Dr. William Marsden	Quebec, Can.	1872.
Dr. E. J. Marsh	Paterson, N.J.	1872.
Rev. C. K. Marshall, D.D.	Vicksburg, Miss.	1878.
Dr. William Martin	New Orleans, La.	1880.
Dr. William Massie	Paris, Ill.	1880.
Dr. R. Matas	New Orleans, La.	1880.
F. Maura	Pensacola, Fla.	1880.
Dr. J. L. Maus	Peoria, Ill.	1880.
M. L. Meacham	Memphis, Tenn.	1880.
Dr. John A. Mead	Pearlington, Miss.	1880.
Dr. T. A. Means	Montgomery, Ala.	1878.
Dr. John F. Meigs	Philadelphia, Penn.	1874.
Dr. J. J. Mellon	New Orleans, La.	1880.
Dr. O. H. Menees	Nashville, Tenn.	1879.
Dr. Thomas Menees	Nashville, Tenn.	1879.
Hon. J. A. Meredith	Richmond, Va.	1878.
Dr. W. D. Middleton	Davenport, Ia.	1879.
Dr. R. F. Michel	Montgomery, Ala.	1880.
Dr. A. J. Miles	Cincinnati, O.	1880.

Dr. J. J. Milhau	New York City.	1873.
Dr. A. J. Miller	Paris, Ill.	1880.
Dr. J. L. Million	Springfield, Ill.	1880.
Prof. J. B. Minor	University of Virginia, Va.	1878.
Dr. Thomas C. Minor	Cincinnati, O.	1874.
Dr. E. J. Mioton	New Orleans, La.	1880.
Dr. R. W. Mitchell	Memphis, Tenn.	1878.
Dr. William S. Mitchell	New Orleans, La.	1880.
Dr. E. R. Montgomery	Louisville, Ky.	1879.
Dr. L. H. Montgomery	Chicago, Ill.	1879.
Robert Moore, C.E.	St. Louis, Mo.	1880.
Dr. H. W. Moore	Sadlersville, Tenn.	1880.
Dr. S. P. Moore	Richmond, Va.	1878.
Hon. William R. Moore	Memphis, Tenn.	1880.
Dr. J. W. Morey	Moline, Ill.	1880.
Dr. John Morris	Baltimore, Md.	1874.
Dr. Moreau Morris	Binghamton, N.Y.	1872.
Dr. Ambrose Morrison	Nashville, Tenn.	1879.
Rev. James Morrow	Philadelphia, Penn.	1880.
Dr. William Morrow	Nashville, Tenn.	1879.
Dr. H. A. Mosely	Wartrace, Tenn.	1879.
Dr. G. A. Moses	St. Louis, Mo.	1880.
Dr. William H. Mullins	Chattanooga, Tenn.	1878.
Prof. Charles E. Munroe	Annapolis, Md.	1876.
Dr. Robert D. Murray, U.S.M.H.S.	Norfolk, Va.	1872.
Prof. W. H. Mussey, M.D.	Cincinnati, O.	1878.
Dr. D. G. Murrell	Louisville, Ky.	1880.
Dr. T. Nagel	New Orleans, La.	1880.
Dr. John T. Nagle	New York City.	1874.
Dr. H. M. Nash	Norfolk, Va.	1878.
Dr. Thomas L. Neal	Dayton, O.	1872.
Gen. R. P. Neely	Bolivar, Tenn.	1879.
Dr. Timothy Newell	Providence, R.I.	1876.
W. C. Nelson	Nashville, Tenn.	1879.
Prof. W. R. Nichols	Boston, Mass.	1875.
Dr. L. H. A. Nickerson	Quincy, Ill.	1879.
Dr. John N. Niglas	Peoria, Ill.	1879.
Dr. L. G. Noel	Nashville, Tenn.	1880.
E. O. Notting	Richmond, Va.	1878.
Dr. J. B. W. Nowlin	Nashville, Tenn.	1879.
Dr. J. N. Nuttall	Memphis, Tenn.	1880.
J. B. O'Bryan	Nashville, Tenn.	1879.
Dr. B. F. O'Daniel	Brunswick, Tenn.	1880.
Fred Law Olmstead	New York City.	1872.
Capt. J. T. O'Pry	New Orleans, La.	1880.
Dr. John Del Orto	New Orleans, La.	1880.
Michael J. O'Shaughnessy	Nashville, Tenn.	1879.
Dr. A. Otterson	Brooklyn, N.Y.	1879.
John Overton, Jr.	Memphis, Tenn.	1880.
Dr. Henry Palmer	Janesville, Wis.	1877.

Dr. F. W. Parham	New Orleans, La.	1880.
Dr. Willard Parker	New York City.	1873.
Dr. Charles W. Parsons	Providence, R.I.	1873.
Dr. John C. Parsons	Hartford, Conn.	1874.
Dr. Julius H. Patski	Fort Frederick Steele, Wy. Ter.	1874.
Dr. W. R. Patton	Charleston, Ill.	1880.
Dr. E. D. Peete	Humboldt, Tenn.	1880.
Henry E. Pellew	New York City.	1876.
H. E. Pendleton	Nashville, Tenn.	1879.
Dr. J. W. Penn	Humboldt, Tenn.	1879.
Dr. John C. Peters	New York City.	1873.
Maj. Green Peyton	University of Virginia, Va.	1878.
Dr. D. L. Pharez	Starkville, Miss.	1880.
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